A

MISCELLANY,

FOR

Young Persons,

BY THOMAS WRIGHT.

In vain, without fair culture's kindly aid,
Without enliv'ning ſuns and genial ſhow'rs,
And ſhelter from the blaſt—in vain we hope
The tender plant can rear it's blooming head,
Or yield the harveſt promis'd in it's ſpring.

Akenside.

PRINTED CHIEFLY FOR THE USE OF THE AUTHOR'S SEMINARY,

At South-Town,

NEAR GREAT YARMOUTH.

PREFACE.

ALTHOUGH ſeveral writers, as well as readers, have ſpoken diſreſpectfully of prefaces, I nevertheleſs declare myſelf in their favour. A preface, exquiſitely written, is a delicious morſel: and if an author is inveterately dull, it is a kind of preparatory information which may be uſeful. It argues a deficiency in taſte, to turn over a preface unread; for it is the odour of the author's roſes; every drop diſtilled at immenſe coſt. It is the reaſon of the reaſoning; the folly of the fooliſh; and, as the Italians ſay, *La ſalſa del libro*,—the ſauce of the book.

A work

A work with a poor preface, like a perſon with an indifferent recommendation, muſt diſplay uncommon merit to maſter our prejudices; and to pleaſe us, as it were, in ſpite of ourſelves. A work, ornamented by a finiſhed preface, inſpires us with awe; we obſerve a veteran guard placed in the porch, and we are induced to conclude from this appearance, that ſome perſon of eminence reſides in the place itſelf.

But of all literary performances, a work like the preſent might be permitted to appear without the accuſtomed preface; becauſe a MISCELLANY is only a kind of preface; it is rather an introduction to ſubjects, than ſubjects themſelves: and like a preface, is frequently more pleaſing than the completer work.

It has been ſaid, that an author obtains no reputation by forming a horn-book for babes;

babes; and that but little difficulty lies in *making* books, by collecting from the labours of others. And yet a painter is not leſs a painter, becauſe he goes out for his colours; nor is an architect leſs an architect, becauſe he purchaſes his building materials. Perhaps there are few books to which an author can prefix his name, without treſpaſſing on his veracity. Sterne ſays, *It is all pouring out of one bottle into another.*

In the following pages I have arranged ſome of the materials of my obſervation; and have blown into a little flame a few ſparks of ſcience. Long-continued abſurdity has no preſcriptive claim to reſpect. Men would ſoon be at a ſtand in their attainments, if they did not derive from experience ſome helps for accelerating the progreſs of the human mind, and for correcting the injudicious methods of thoſe who preceded them. Perfection, though unattainable, muſt ſtill be the

frequent

frequent object of our contemplation, because every kind of excellence is a portion of perfection; and no portion can be accurately appreciated, if we are incapable of forming some idea of the whole.

CONTENTS.

V
T
T

A
F
T
F
V
V
A
S
A
B
S
F
V

M
D
A

Address.

YE docile youths who learning love,
And would in various arts improve,
To South-Town come, and there attend
The precepts of a watchful friend.

When morning's light unſeals your eyes.
And to your ſtudies bids you riſe;
Firſt to the GREAT CREATOR pray
To bleſs the bus'neſs of the day:
For know thoſe labours are but vain,
Which no celeſtial bleſſings gain.
When waſh'd, and decent in your dreſs,
And each in ſchool aſſumes his place;
Study the taſk that is aſſign'd,
And get it with a willing mind:
But while you at your books remain,
Silence muſt hold her ſtricteſt reign;
For this I've found by daily uſe,
Will to your progreſs much conduce.

You that in *Writing* would excel,
Muſt imitate your copies well:
Down ſtrokes make *ſtrong*, the upward, *fine*,
And freedom with your boldneſs join.

If by luxuriant fancy bent,
You aim at curious ornament—
Your plaſtic pen, by frequent uſe,
May fiſhes, birds, and beaſts produce;
But chiefly ſtrive to gain a *hand*
For *Bus'neſs*—with exact command.

When *Figures* exerciſe your quill,
They aſk for all your care and ſkill.
In writing, fancy's whim may guide,
But reaſon here muſt be appli'd.
As you the ſteep aſcent purſue,
Expanding ſcenes will bleſs your view:
The *Mathematics'* ſpacious field,
Will noble, uſeful proſpects yield;
And as by *Globes*, o'er ſeas you rove,
Or trace the glowing orbs above—
Wond'ring, JEHOVAH's pow'r you'll find,
While *Reaſon* ſatisfies the mind.

Who in *Compoſing* would excel,
Muſt underſtand his grammar well:
Structures of learning, none can raiſe,
Except he this foundation lays.

When from the *School* you are diſmiſs'd,
And have my leave to play or reſt—
(For he with eaſe his labours bears
Who mixes pleaſure with his cares,)
Still let my dictates have their ſway,
And regulate you in your play.

Such

Such ſportful exerciſes chooſe,
As will the moſt to health conduce;
The *Swings*, the *Kick-ups*, *Hoops* and *Ball*,
By turns the junior pupils call;
But ſenior boys ſhould e'er reſort
To ſome more ſtrong and manly ſport.
Yet mind you give no way to rage,
Nor money in your play engage;
For ſordid thirſt of gain deſtroys
The peace of mind of men and boys.

Ever abhor a lying tongue,
And never do your fellow wrong;
From oaths and idle talk refrain,
And tales of ghoſts—they're falſe as vain:
But if to ſtudy you're inclin'd,
And wiſh refreſhment for your mind,
Hiſtorians, and poetic lays
Impart inſtruction while they pleaſe;
The *School* with various books abound,
In which advice and mirth are found;
For moral leſſons, finely ſaid,
There the *Spectators* you may read—
While ev'ry hue of fancy ſhines
In the *Selections'* ſpotleſs lines:
There, what inſtructive *Fables* ſay,
You ſoon may learn of gentle Gay—
But wanton ſongs and wild romance
Are baniſh'd, baniſh'd far from hence.

Soon as your judgment waxes ſtrong,
And can diſtinguiſh right and wrong;
Think it no taſk to read, O YOUTH!
The Teſtaments of ſacred truth:
Pore them with fixt attention through,
And aſk whate'er you do not know;
Search them by day with fond delight,
And meditate on them by night.

When, for your meals, the bell you hear,
Without the leaſt delay appear;
At table in decorum ſit,
Nor prate—it's vulgar when at meat:
In food obſerve the golden mean;
And keep your clothes and linen clean.
And when you've eat' what doth ſuffice,
Give thanks, then in good order riſe.

One precept yet remains behind,
Which you muſt ever keep in mind;
Of fooliſh chat in bed beware,
Be ſilent and be modeſt there:
Thus, as your head the pillow bears
Apply to HIM who always hears
The breathings of a pious breaſt,
And ſafely you may ſink to reſt.

Select Sentences,

ARRANGED

ALPHABETICALLY.

He may be juſtly numbered amongſt the benefactors of mankind, who contracts the great rules of life into ſhort ſentences, that may be eaſily impreſſed on the memory, and taught by frequent recollection to recur habitually to the mind.

Dr. Johnson.

A Quiet conſcience ſleeps in thunder.

Aſk thy purſe what thou ſhouldſt buy.

A fault once denied is twice committed.

A faithful friend is the medicine of life.

A good man can never be miſerable, nor a wicked man happy.

A wiſe and good man is never leſs alone than when alone.

As the ſhadow waiteth on the ſubſtance, ſo true honour attendeth upon virtue.

A little wrong done to another, is a great wrong done to ourſelves.

A great man will not trample on a worm, nor ſneak to an Emperor.

A few pains and a few pleaſures, are all the materials of human life.

Abundance is a trouble; want a miſery; honour a burthen; advancement dangerous; but competency a happineſs.

Aſſociate with perſons rather above than beneath yourſelf; gold, pocketed with ſilver, loſeth both it's colour and weight.

A man who keeps riches and enjoys them not, is like an aſs that carries gold and eats thiſtles.

As the roſe breatheth ſweetneſs from it's own nature; ſo the heart of a benevolent man produceth good works.

A good layer up makes a good layer out; and a good ſparer makes a good ſpender. No alchymy like ſaving.

Be lively but not light; ſolid but not ſad.

Borrow not too much upon time to come.

By others' faults, wiſe men correct their own.

Be grateful to thy father, for he gave thee life; and to thy mother, for ſhe ſuſtained thee.

Confine your tongue, or it will confine you.

Craft begs for clothes; truth loves to go naked.

Cloſe thine ear againſt thoſe that open their mouths againſt others.

Children obey your parents: honour thy father and mother is the firſt commandment with promiſe.

Depend on God, for he is independent.

Diffidence averts envy from excellence, and cenſure from miſcarriage.

Do good with what thou haſt, or it will not do thee good.

Death hath nothing terrible in it, but what life hath made ſo.

Do nothing in thy paſſion. Why wilt thou put to ſea in the violence of a ſtorm?

Do good to thy friend that he may be more thy friend; and unto thy enemy, that he may become thy friend.

Diligence is the parent of intelligence and the diſpenſer of excellence: ſhe commands all arts and ſciences: and crowns her lovers with honour.

Every *May-be* hath a *may-not-be*.

Every fool can find faults which many wiſe men cannot remedy.

Examples do not authoriſe a fault: vice muſt never plead preſcription.

Envy not the appearance of happineſs in any man; for thou knoweſt not his ſecret griefs.

Enough of evil is allotted unto man; but he maketh it more while he lamenteth it.

Foreſight is the right eye of prudence.

Few envy the merit of others, that have any of their own.

Fear may keep a man out of danger; but courage only can ſupport him in it.

Friendſhip improves happineſs and abates miſery, by the doubling of our joy and dividing our grief.

Frugality may be termed the daughter of prudence; the ſiſter of temperance; and the parent of liberty.

Good offices are the cement of ſociety.

Getting is a chance, but keeping a virtue.

Good nature is a misfortune if it wants prudence.

Gratitude preſerves old friendſhip, and procures new.

Grateful people reſemble thoſe fertile lands, which give more than they receive.

Good works will never ſave you; but you will never be ſaved without them.

Good actions once reſolved, ſhould be like fixed ſtars, not ſubject to retrograde motions.

Hurry trips up it's own heels.

He that walks only by the light of nature, walks in darkneſs.

He that finds a thing ſteals it, if he endeavours not to reſtore it.

He who is revengeful keeps his wounds open, which otherwiſe would cloſe of themſelves.

He who makes an idol of his intereſt, will make a martyr of his integrity.

He

He is a happy man who hath a friend at his need; but he is more happy who needeth not a friend.

He who gave thee paſſions, gave thee reaſon to ſubdue them: exert that reaſon, and paſſions ſhall fall at thy feet.

Imprudence is the conſtant companion of the monſter ingratitude.

It is wiſe not to ſeek a ſecret; and honeſt not to reveal it.

If you would know the value of a ducat, try to borrow one.

If you can ſay no good of your neighbour, ſay no ill of him.

If you are not good for any thing, do not expect any thing from men.

It is with our time as with our eſtates; a good manager makes much of it.

In your worſt ſtate hope, in your beſt fear; but in both be circumſpect: man is a watch which muſt be looked to, and wound up every day.

Just praiſe is only a debt; flattery is a preſent.

Keep your ſhop, and your ſhop will keep you.

Knowledge is the treaſure; but judgment the treaſurer of a wiſe man.

Knowledge will ſoon become folly, if good ſenſe ceaſes to be it's guardian.

Live and let live.

Liberality is not giving largely, but giving wiſely.

Learn how to receive, and know how to refuſe a favour.

Learning is preferable to riches; and virtue to both.

Leiſure without learning is death; and idleneſs is the grave of a living man.

Let not adverſity tear off the wings of hope; neither let proſperity obſcure the light of prudence.

Make other perſons' ſhipwrecks thy ſea-marks.

Moderation is commonly firm; and firmneſs is commonly ſucceſsful.

Make no enemies; he is inſignificant who can do thee no harm.

Men never have a better opinion of us, than when we aſſiſt them to have a good opinion of themſelves.

Never wade in unknown waters.

Never wiſh a thing done, but do it.

Nothing is more ridiculous than to be ſerious about trifles, and to be trifling about ſerious matters.

No ſummer but has a winter: he never reaped comfort in his adverſity, who ſowed it not in his proſperity.

Obedience is better than many oblations.

Our virtues would be proud, if our vices whipped them not.

Often remembering an injury, does us more hurt than receiving it.

Only good and wiſe men can be friends; others are but companions.

One often repents of ſaying too much; but ſeldom of ſaying too little.

Omit no opportunity of doing good; and you will find no opportunity for doing ill.

Our life is like a comedy: the breakfaſt is the prologue; dinner the interlude; and ſupper the epilogue.

Point not at another's ſpots with a ſoiled finger.

Prepare for ſickneſs in health; and old age in youth.

Piety is the only proper and adequate relief of decaying man.

Pardon all, where there is either ſign of repentance, or hope of amendment.

Proſperity is not a juſt ſcale: adverſity is the only balance to weigh friends.

Put a bridle on thy tongue; leſt the words of thine own mouth deſtroy thy peace.

Quantity is of leſs conſequence than quality.

Repentance is the whip for fools.

Remember that loſt time never returns.

Religion

Religion is the beſt armour; but the worſt cloak.
Reputation is to virtue, as light to a picture.
Riches beget pride; pride, impatience; impatience, revenge; revenge, war; war, poverty; poverty, humility; humility, patience; patience, peace; and peace, riches.

Sell not virtue to purchaſe wealth.
Sins, like debts, are always more than we think them to be.
Superſtition renders a man a fool; and ſcepticiſm makes him mad.
Storms in the conſcience will always lodge clouds in the countenance.

True greatneſs is to be maſter of ourſelves.
To live is a gift; to die is a debt.
The only way to be amiable is to be affable.
The beſt way of revenge is not to imitate the injury.
The greateſt misfortune is not to be able to bear misfortune.
The comfort of virtuous parents, is to have children that reſemble them.
The ſum of Chriſtian morality is, *give and forgive*; *bear and forbear*.
'Tis virtue only that repels fear; and fear only that makes life troubleſome.
The luxurious live to eat and drink; but the temperate eat and drink to live.
The great buſineſs of man is to improve his mind, and govern his manners.

To

To dread no eye, and to ſuſpect no tongue, is the great prerogative of innocence.

To own yourſelf in an error, is to ſhew that you are wiſer than you were.

The whole univerſe is your library; converſation, living ſtudies; and remarks upon them, your beſt authors.

To imitate the beſt, is the beſt imitation; and a reſolution to excel, is an excellent reſolution.

The tears of the compaſſionate are ſweeter than dew-drops, falling from roſes on the boſom of the earth.

The ſpeech of a modeſt man giveth luſtre to truth; and the diffidence of his words excuſeth his error.

The clock of the tongue will go wrong, if it be not ſet by the dial of the heart.

The thunder burſteth over the head of the innocent in vain; and the lightning ſerveth to ſhow the glories of his countenance.

The main of life is compoſed of inſect vexations, which ſting us and fly away; and of impertinencies, which buzz awhile about us, and are heard no more.

To be humble to your ſuperior is duty; to equals, courteſy; to inferiors, nobleneſs; to all, ſafety: fortune may begin a man's greatneſs; but it is virtue that muſt continue it.

Man-

Vain-glory bloſſoms, but never bears.

Virtue is the greateſt ornament; and good ſenſe the beſt equipage.

Understanding a thing is half doing it.

Uſeful knowledge has no enemies, except the ignorant: it cheriſhes youth; delights age; is an ornament in proſperity; and a comfort in adverſity.

Would you excel in arts; excel in induſtry.

Wealth, without friends, is like life without health.

Wiſdom is better without inheritance, than inheritance without wiſdom.

Would you perpetuate your reputation, do things worth writing, or write things worth reading.

Xenophon counted the wiſe man happy.

Young men, when once dyed with pleaſure, will ſeldom take any other colour.

Young people tell what they do; old people, what they have done; and fools, what they intend to do.

You may be ſeen to give; but give not to be ſeen.

Zeal, without knowledge, is but religious wild-fire.

Maxims,

IN

VERSE.

GIVE God, thy Great Creator, homage due;
Conſider firſt thy bus'neſs, then purſue:
Converſe with honeſt men; let ſuch be dear:
In ſelf-conceitedneſs let nought appear:
To others' judgment due regard be ſhown;
Be ever modeſt to defend thy own:
Whoever ſpeaks, him with attention hear:
Nor ſtudy how to make thy wit appear:
Talk that to each which each beſt underſtands,
The tongue pronouncing what the heart commands:
Think on thy promiſe; but diſdain t'evade,
By ſubtle arts, your promiſes when made:
Let ſpeech obliging, gently, ſweetly fall;
And in your looks, at leaſt, be kind to all:
Let your whole air be diſengag'd and free;
Yet not invite familiarity:
Give none, by haſty judgment, cauſe to grieve;
Love without intereſt; without fear forgive:
Avoid contention; friendſhip cultivate;
Reſpect, but never fawn upon the great:
Aim not to make thy friend his thoughts reveal;
With ſeeming openneſs thy own conceal:

Lend

Lend readily, if lending you propoſe;
He doubly gives, who gracefully beſtows:
Weigh well the talent for the part you'd play;
Avoid extremes, and chooſe the middle way:
Speak peace where diſcord reigns; aſſuage the flood;
And for revenge perſiſt in doing good:
Let proper objects never want a tear;
Excuſe miſtakes; in friendſhip be ſincere:
From peeviſh thoughts thy cheerful mind defend;
Nor in raſh words diſcharge upon thy friend:
Reprove with gentleneſs; with truth commend;
Laugh at a jeſt; but laugh not without end:
To each man's calling juſt reſpect be ſhown;
Nor criticiſe to make your learning known:
Do favours privately; if you upbraid,
Or publiſh firſt, the obligation's paid:
Prevent petitions where you ſee diſtreſs;
Nor let the manner make the gift the leſs:
If anger kindle, check th' impetuous flame;
Nor let thy tongue traduce an abſent name:
Let not ingratitude thy honour ſtain;
Play for diverſion; but deſpiſe the gain:
Scorn to deceive; think much, but little ſpeak;
Preſerve what's giv'n you, for the giver's ſake:
Pardon your debtors—equal pleaſure flows
To him who mercy finds, and him who mercy ſhows:
Be envy baniſh'd from the gen'rous heart;
Blab not the ſecrets which thy friends impart:
In ſpeaking of thyſelf, nor praiſe, nor blame;
And dread to be a ſlave to common fame.

Questions,

FOR THE INSTRUCTION OF CHILDREN,

IN THE

CHURCH CATECHISM.

On the Privileges of Baptism.

P. WHAT were you made at your baptism?
S. A member of Christ.
P. Whose child were you made?
S. God's child.
P. Of what were you made an inheritor?
S. Of the kingdom of heaven.
P. Were these privileges conferred upon you without any conditions?
S. No.
P. What are the conditions?
S. That I perform my baptismal vow.
P. What is your baptismal vow?
S. To renounce the devil and all his works.
P. Who promised you should do this?
S. My godfathers and godmothers.

P. In whoſe name did they promiſe it?
S. In my name.
P. What did they promiſe that you ſhould believe?
S. All the articles of the chriſtian faith.
P. What did they promiſe that you ſhould keep?
S. God's holy will and commandments.
P. Are you willing to do all that your godfathers and godmothers promiſed for you?
S. Yes.
P. But do you think you are able to do it of your own ability?
S. No.
P. How then do you think you ſhould be enabled to do it?
S. By God's help.
P. What muſt you do to obtain God's help?
S. I muſt pray to God for it.

On the Creed.

P. WHO is God?
S. The Supreme Being.
P. Who is the Father Almighty?
S. God.
P. Did God make heaven and earth?
S. Yes.

P. Who

P. Who is Jeſus Chriſt?
S. The only ſon of God.
P. Whom do we call our Lord?
S. Jeſus Chriſt.
P. Who was conceived by the Holy Ghoſt?
S. Jeſus Chriſt.
P. Who was born of the Virgin Mary?
S. Jeſus Chriſt.
P. Who ſuffered under Pontius Pilate?
S. Jeſus Chriſt.
P. Who was Pontius Pilate?
S. A governor of Judea, in the reign of Tiberius.
P. What death did Jeſus Chriſt ſuffer?
S. He was crucified.
P. On what day did he riſe from the dead?
S. The third day.
P. Whither did he aſcend?
S. Into heaven.
P. To what place?
S. To the right hand of God.
P. Why do you ſay to the right hand of God? Hath God hands?
S. No: God is a ſpirit, and hath no body, nor parts of a body.
P. What then do you mean by the right hand of God?
S. The chief place of honour and dignity, under God the Father.

P. Shall Jeſus Chriſt ever come from the right hand of God?

S. Yes.

P. What ſhall he come to do?

S. To judge the quick and the dead.

P. Shall every one, on that day, give an account of his thoughts, words and actions?

S. Yes: and therefore this is the moſt ſerious truth that ever was revealed to mankind.

P. Can any eſcape this judgment?

S. None.

P. How many perſons do you believe in?

S. Three.

P. Which are they?

S. God the Father, God the Son, and God the Holy Ghoſt.

P. To which of theſe is the *creation* of the world aſcribed?

S. To God the Father.

P. To which is the *redemption* of the world aſcribed?

S. To God the Son.

P. What does the Holy Ghoſt for us?

S. He *ſanctifies* us.

P. Who is the Holy Ghoſt?

S. The Third Perſon in the Sacred Trinity.

P. Is not the Holy Ghoſt God?

S. Yes.

P. You

P. You ſay, that you believe in God the Father, God the Son, and God the Holy Ghoſt— Are theſe three Gods?

S. No.

P. What are they then?

S. Three perſons in one Godhead.

On the Commandments.

P. WHAT is the firſt commandment?

S.

P. What is the ſecond?

S.

P. What is the fourth?

S.

P. What is the eighth?

S.

P. The ſeventh?

S.

P. The ninth?

S.

P. The ſixth?

S.

P. Which of them forbids all acts of cruelty, malice and revenge?

S. The ſixth.

P. Which forbids ſtubbornneſs, diſobedience, and undutifulneſs to parents?

S. The fifth.

P. Which forbids ſtealing?

S. The eighth.

P. Which forbids lying and ſlandering?

S. The ninth.

P. Which forbids ſwearing, curſing, and taking God's name in vain.

S. The third.

P. Which of them requires us to be faithful to the intereſt, character, and good name of our neighbour?

S. The ninth.

P. Which requires us to pray to God to hear his word read and preached; and to attend the ordinances of religion?

S. The fourth.

P. Which commandment requires the duty of temperance, ſoberneſs and chaſtity?

S. The ſeventh.

P. What does the fifth commandment require, with reſpect to your father and mother?

S. To love, honour and ſuccour them.

P. What is your duty to the king, and all that are put in authority under him?

S. To honour and obey them.

P. In what manner are you to demean yourſelf to your teachers, ſpiritual paſtors and maſters?

S. To

S. To ſubmit myſelf to them.

P. How are you to behave to your betters?

S. Lowly and reverently.

P. What are you *not* to do to any body?

S. I muſt not hurt any one.

P. What are you to be in all your dealings?

S. True and juſt.

P. What are you *not* to bear in your heart?

S. Neither malice nor hatred.

P. What are you to keep your hands from?

S. Picking and ſtealing.

P. From what are you to keep your tongue?

S. From evil ſpeaking, lying and ſlandering.

P. How are you to keep your body?

S. In temperance, ſoberneſs and chaſtity.

P. What are you *not* to do with reſpect to other men's goods?

S. I am not to covet nor deſire them.

P. What are you to learn and labour for?

S. To get my own living.

P. And what are you to do in *that* ſtate of life, unto which it hath pleaſed God to call you?

S. I am to do my duty.

On Prayer.

P. ARE we able of ourſelves to believe and to do all that we promiſed in our baptiſm?

S. No.

P. What ought we to do then?

S. We ought to pray to God for his grace to aſſiſt us in the performance of our duty.

P. What is grace?

S. The favourable influence of God on the human mind.

P. Will the bare repetition of our prayers be ſufficient to recommend us to the favour of God?

S. No.

P. What does God require of us when we pray?

S. He requires of us to pray with our hearts as well as with our lips.

P. Will our prayers be conducive to our happineſs without our endeavours?

S. No.

P. What prayer are we commanded to uſe?

S. The Lord's prayer.

P. Is not prayer one of the principal means of grace?

S. Yes.

P. What is another means of grace?

S. Receiving the bleſſed ſacrament.

On the Sacraments.

P. WHAT do you mean by the word ſacrament?

S. I mean an outward and viſible ſign of an inward and ſpiritual grace.

P. How many ſacraments are there?

S. Two.

P. Which are they?

S. Baptiſm, and the ſupper of the Lord.

P. How many parts are there in a ſacrament?

S. Two.

P. What are thoſe parts?

S. The *outward viſible* ſign, and the *inward ſpiritual* grace.

P. What is the outward ſign in the ſacrament of baptiſm?

S. Water.

P. With what are perſons baptized?

S. Water.

P. In whoſe name are they baptized?

S. In the name of the Father, and of the Son, and of the Holy Ghoſt.

P. What is the inward or ſpiritual thing ſignified?

S. A death unto ſin.

P. By

P. By whom were thoſe ſigns ordained?

S. By Chriſt himſelf.

P. Is any thing required of perſons to be baptized?

S. Yes; repentance and faith.

P. What do you mean by repentance?

S. The forſaking of ſin.

P. What is faith?

S. Truſt in God.

P. If faith and repentance are required of baptized perſons, why then are infants baptized, when, by reaſon of their tender age, they cannot perform faith and repentance?

S. Becauſe the infants promiſe faith and repentance by their godfathers and godmothers; which promiſe, when the infants come to age, themſelves are bound to perform.

P. What was the deſign of inſtituting the ſacrament of the Lord's ſupper.

S. For the continual remembrance of the ſacrifice of the death of Chriſt, and of the benefits which we receive thereby.

P. What was the outward ſign of the ſacrament of the Lord's ſupper?

S. Bread and wine.

P. What is the inward thing ſignified?

S. The body and blood of Chriſt.

P. By whom is the body and blood of Chriſt received after a ſpiritual manner?

S. By the faithful.

P. Is

P. Is the body and blood of Chriſt received after a ſpiritual manner by none but the faithful?

S. No.

P. What are the advantages of receiving this bleſſed ſacrament worthily?

S. The ſtrengthening and refreſhing of our ſouls, by the body and blood of Chriſt.

P. Is any thing required of thoſe who come to the ſacrament of the Lord's ſupper?

S. Yes, they muſt examine themſelves.

P. How muſt they examine themſelves?

S. Whether they repent *truly* of their former ſins.

P. What muſt they purpoſe?

S. To lead a new life.

P. In what manner muſt they purpoſe to lead a new life?

S. Stedfaſtly.

P. What muſt thoſe who come to the ſacrament of the Lord's ſupper examine themſelves in next?

S. Whether, through Chriſt, they have a lively faith in God's mercy.

P. What is further to be examined?

S. Whether they have a thankful remembrance of the death of Chriſt.

P. What is to be examined in the laſt place?

S. Whether they are in charity with all men.

THE

Ten Commandments,

IN VERSE.

1. HAVE thou no other gods but me,
2. And to no image bend thy knee:
3. Take not the name of God in vain;
4. Nor e'er the ſabbath-day profane.
5. Thy father love and mother too;
6. And mind, thou ſhalt no murder do.
7. From vile adultery keep clean;
8. Nor ſteal, tho' thou art poor and mean:
9. Be no falſe teſt, thy ſoul 'twill ſpot;
10. And what's thy neighbour's, covet not.

The Sum of all the Commandments.

LOVE God, of ev'ry thing above;
And as thyſelf, thy neighbour love.

An Account

OF

THE BOOKS

OF

The Old and New Testament.

SOME of theſe books are ſtyled Canonical, and others Apocryphal. The canonical books are ſo called, becauſe they have been received among thoſe excellent writings, in the Old Teſtament, which are univerſally acknowledged to have been penned by the prophets and holy men, inſpired by God; as thoſe in the New Teſtament were by the the diſciples of Chriſt.

The firſt five of theſe books, namely, Geneſis, Exodus, Leviticus, Numbers, and Deuteronomy, were written by Moſes, and are called the Pentateuch.

The Book of Joſhua is ſuppoſed to have been written, partly by himſelf, and partly by Eleazer, the high prieſt.

The books of Judges and Ruth, are generally allowed to have been written by Samuel.

The

The firſt and ſecond books of Samuel, were written by Samuel, the ſeer; Nathan, the prophet; and Gad, the ſeer.

The firſt and ſecond books of Kings, were written by Nathan, the prophet; Aliah, the Shilohite; Iddo, the ſeer; Jehu, the prophet; and Simeia.

The firſt and ſecond books of Chronicles, were compiled by Simeia, and Iddo, the ſeer.

The books of Ezra, and the books of Nehemiah, were written by Ezra, the prieſt.

The book of Eſther, was compiled by Ahaſuerus, out of the records of the Medes and Perſians.

The book of Job is ſuppoſed to have been written by Elihu, to recommend patience to us, under all afflictions, with an entire dependance upon God in all adverſities. Job was a good man; a near relation to Abraham, who lived in Arabia, about the time that the Iſraelites were in bondage.

The Pſalms were written by ſeveral perſons; but the principal part of them, by David, Moſes, and Aſaph; and were collected into a book by Eſdras.

The Proverbs, Eccleſiaſtes, and Canticles, (or Songs) were written by King Solomon.

Of the Books of the Prophets.

THESE holy men were called prophets, becauſe they foretold future events by divine revelation.

Isaiah, the ſon of Amos, prophefied in the days of the kings Uzziah, Jothan, Ahaz, Hezekiah, and Manaſſes: He foretold, in a diſtinct manner, the coming of Chriſt; and the numerous circumſtances attending his divine miſſion.

Jeremiah, ſon to Hilkiah, the prieſt, prophefied in the days of Joſiah, Jehoiakim, and Zedekiah. He alſo wrote the book of Lamentations, in the time of the Babyloniſh captivity.

Ezekiel was a prieſt, and compoſed his prophecy in Babylon, in the time of Jehoiakim's captivity.

Daniel was a captive in Babylon; and prophefied in the days of Nebuchadnezzar, Evil—Merodach, and Belſhazzar.

Hoſea prophefied in the reign of Uzziah, Jothan, Ahaz, and Hezekiah.

Joel prophefied in the days of Uzziah and Jeroboam.

Amos was a poor ſhepherd, and prophefied at the ſame time with Hoſea and Joel.

Obediah

Obadiah foretold the deſtruction of the Idumeans, who were the deſcendants of Eſau, Jacob's brother.

Jonah lived in the reigns of Amaziah and Jeroboam; and propheſied againſt Nineveh, the chief city of the Aſſyrians.

Micah propheſied at the ſame time with Iſaiah; and foretold the deſtruction of Iſrael and Judah, by the Aſſyrians and Chaldeans.

Nahum propheſied in the reigns of Hezekiah; he foretold the deſtruction of the Aſſyrians, by the Chaldeans and Medes.

Habakkuk propheſied about the ſame time; and foretold the deſtruction of Iſrael and Judah, by the Chaldeans.

Zephaniah propheſied in the days of Joſiah, a few years before the Babyloniſh captivity; and threatened Judah and Jeruſalem with deſolation.

Haggai propheſied, after the return of the Jews from their ſeventy years' captivity in Babylon, and exhorted them to rebuild the temple.

Zechariah was ſent to confirm the doctrine of Haggai, and to forward the building of the temple,

Malachi propheſied after the temple was rebuilt; and was the laſt of the prophets.

Of the Apocryphal Books.

THESE are ſo called, becauſe they are not certainly known to be true ſcripture. They were not written in Hebrew; yet the greateſt part of them are excellent; and contain obſervations, worthy of our ſerious attention.

OF

THE BOOKS

OF

THE NEW TESTAMENT:

AND FIRST OF

The Four Goſpels.

THE word Goſpel is ſo called from the Saxon words *Godes Spel*, in Engliſh, Good Tidings; which, for better ſound, is written and pronounced Goſpel. Theſe books contain the hiſtory of the birth, life, actions, precepts, promiſes, death, reſurrection, and aſcenſion of Chriſt.

The compilers of them, namely, St. Matthew, St. Mark, St. Luke, and St. John, are called evangelists.

St. Matthew wrote his gospel *eight* years after Christ's ascension.

St. Mark wrote his gospel, under the direction of St. Peter, *ten* years after the ascension.

St. Luke wrote his gospel *fifteen* years after the ascension; and,

St. John penned his gospel *thirty-two* years after the ascension.

The acts of the apostles were written by St. Luke.

The epistles to the Romans, Corinthians, Galatians, Ephesians, Philippians, Timothy, Titus, Philemon, and the Hebrews, are by St. Paul.

The other epistles were written by St. James, the son of Alpheus, the brother of Jude; (called also the brother of our Lord) St. Peter, one of the chief of the apostles; St. Jude, an apostle; and St. John, the son of Zebedee; who also wrote the Revelations.

THE

ORDER OF THE BOOKS

In the Bible.

GENE—Ex. Levit—Num. Deuter—Jos.
Judge—Ruth, *and* Samu—Kings, Chron.
Ezra—Ne. Esther—Job, *and the* Psalms,
Prov—Ecclesiastes, Sol—Son.
Isa—Jer. Lament—Eze. Dan—Ho.
Jo—Amos. Ob—Jonah *and* Mi.
Nahum—Hab. Zephaniah—Haggai,
Zechariah, *and last* Malachi.

THE

ORDER OF THE BOOKS

In the New Testament.

Matthew—Mark, Luke—*and*—John, Acts—
and—Rom.
Corinth—Gal. E—Phi—Col. Thessalon,
Timo—Ti. Phile—Hebrews, Jam—Pe.
John, Jude, *and the* Revelation.

THE

Old and New Testament

DISSECTED.

Books in the Old Testament	39
Chapters	929
Verses	23214
Words	592439
Letters	2728100

Books in the New Testament	27
Chapters	260
Verses	7959
Words	181253
Letters	838380

Books in both the Bible and Testament	66
Chapters	1189
Verses	31173
Words	773692
Letters	3566480

Apocrypha.

Chapters	183
Verses	6081
Words	152185

THE middle chapter, and the leaſt in the bible, is the 117th Pſalm.

The middle verſe is the 8th of the 118th Pſalm.

The word AND occurs in the Old Teſtament, 35543 times.

The ſame word occurs in the New Teſt. 10684 times.

The word JEHOVAH occurs 6855 times.

Old Teſtament.

THE middle book is Proverbs.

The middle chapter is the 29th of Job.

The middle verſes are the 17th and 18th of the 20th chap. of the 2d. Chron.

The leaſt verſe is the 1ſt. verſe of the 1ſt. chap. of the 1ſt. Chron.

New Teſtament.

THE middle book is the 2d of Theſſalonians.

The middle chapters are the 13th and 14th Romans.

The middle verſe is the 17th of the 17th chap. Acts.

The leaſt verſe is the 35th of the 11th chap. John.

The 21ſt verſe of the 7th chap. Ezra has all the letters of the alphabet.

The 19th chap. of 2d of Kings, and the 37th of Iſaiah, are alike.

An Explanation

OF THE CHURCH

FASTS AND FESTIVALS.

Epiphany.

A CHURCH feſtival, celebrated on the twelfth day after Chriſtmas, in commemoration of our Saviour's being manifeſted to the world, by the appearance of a miraculous blazing ſtar, which conducted the *Magi* to the place where he was.

Plough-Monday.

THE next Monday after Twelfth-day, when our northern peaſants draw a plough from door to door, begging money to purchaſe drink with.

Septuagesima Sunday.

THE third Sunday before Lent: ſo called from it's being about ſeventy days before Eaſter.

Candlemas Day.

So called, becauſe on that day (Feb. 2) candles are conſecrated by the papiſts: it is the feſtival of the purification of the Virgin Mary.

Sexagesima Sunday.

THE ſecond Sunday before Lent; ſo called from it's being about ſixty days before Eaſter.

Quinquagesima Sunday;

OR,

SHROVE SUNDAY.

Is ſo called from it's being about fifty days before Eaſter.

Shrovetide.

THE time in which our anceſtors went to *ſhrive*, or *confeſs*.

Shrove-Tueſday.

THE day before Aſh-Wedneſday.

Aſh-Wedneſday.

THE firſt day of Lent; ſo called from the ancient cuſtom of faſting in *ſackcloth* and *aſhes*.

Lent.

THE forty days of abſtinence from Aſh-Wedneſday to Eaſter.

Ember Week.

A WEEK on which an ember day falls. The ember days, at the four ſeaſons are the Wedneſday, Friday, and Saturday after the firſt Sunday in Lent; the feaſt of Pentecoſt; September fourteenth; and December thirteenth.

Annunciation.

THE delivery of a meſſage, particularly applied to the feſtival of Lady-Day, March the twenty-fifth, kept in remembrance of the angel's meſſage to the Virgin Mary, concerning our Saviour's birth.

Palm Sunday.

THE Sunday before Easter; so called from Christ's being met by the people, with palms in their hands.

Good Friday.

THE day on which our Saviour's crucifixion is commemorated.

Easter Day.

THE day on which the Christian church commemorates our Saviour's resurrection.

Rogation Week.

THE week immediately preceding Whitſunday, thus called from three faſts obſerved therein, Monday, Tueſday and Wedneſday; called Rogation days, becauſe of the extraordinary prayers and proceſſions then made for the fruits of the earth, or as a preparation for the devotion of Holy Thurſday.

Ascension Day.

THE day on which the aſcenſion of our Saviour is commemorated, commonly called Holy Thurſday; the Thurſday but one before Whitſuntide.

Whitsuntide.

(SO called from White and Sunday, becauſe the converts, newly baptized, appeared from Eaſter to Whitſuntide

Whitſuntide in white.) A feſtival kept ſeven weeks after Eaſter, in remembrance of the deſcent of the Holy Ghoſt upon the Apoſtles. Whitſuntide is likewiſe called the feaſt of Pentecoſt, a feaſt among the Jews, when they offered the firſt fruits of wheat harveſt, which then was completed: it was inſtituted to oblige the Iſraelites to repair to the temple; there to acknowledge the Lord's dominion, and alſo to render thanks to God for the laws he had given them from mount Sinai, on the fiftieth day after their coming out of Egypt.

Trinity Sunday.

THE firſt Sunday after Whitſunday.

Michaelmas.

THE feaſt of the archangel Michael, celebrated on the twenty-ninth day of September.

Advent.

THE name of one of the holy ſeaſons, ſignifying *the coming*; that is, the coming of our Saviour; which is made the ſubject of our devotion during the four weeks before Chriſtmas.

Christmas Day.

THE twenty-fifth day of December, on which the nativity of our bleſſed Saviour is celebrated, by the particular ſervice of the church.

Childermas, or Innocents' Day.

CHILDERMAS day, the twenty-eighth of December, obſerved in commemoration of Herod's ſlaying the innocent children.

Liturgy.

A formulary of public devotions.

Litany.

A form of ſupplicatory prayer.

Rubric.

DIRECTIONS printed in books of law, and in prayer books; ſo termed, becauſe ſuch directions were originally diſtinguiſhed by being *red*.

TEXTS,

CONTAINING A SUMMARY

OF THE

Christian Religion.

Pſalm 19.

VERSE 1. The heavens declare the glory of God, and the firmament ſheweth his handy work.

Verſe 2. Day unto day uttereth ſpeech, and night unto night ſhoweth knowledge.

Nehemiah, Chapter 9.

VERSE 6. Thou even thou art Lord alone; thou haſt made heaven, and the heaven of heavens, with all their hoſt; the earth and all things that are therein; and thou preſerveſt them all: and the hoſt of heaven worſhippeth thee.

Ecclesiastes, Chapter 12.

VERSE 1. Remember now thy Creator in the days of thy youth, while the evil days come not, nor the years draw nigh, when thou ſhalt ſay, I have no pleaſure in them.

1 Chronicles, Chapter 28.

VERSE 9. And thou, Solomon, my ſon, know thou the God of thy father, and ſerve him with a perfect heart, and with a willing mind; for the Lord ſearcheth all hearts, and underſtandeth all the imaginations of the thoughts: if thou ſeek him he will be found of thee; but if thou forſake him he will caſt thee off for ever.

Micah, Chapter 6.

VERSE 8. He hath ſhowed thee, O man, what is good; and what doth the Lord require of thee, but to do juſtly, to love mercy, and to walk humbly with thy God?

Psalm 119.

VERSE 9. Wherewithal ſhall a young man cleanſe his way? by taking heed thereto, according to thy word.

Titus, Chapter 2.

VERSE 11. For the grace of God that bringeth ſalvation hath appeared to all men.

Verſe 12. Teaching us that, denying ungodlineſs and worldly luſts, we ſhould live ſoberly, righteouſly, and godly in this preſent world;

Verſe 13. Looking for that bleſſed hope, and the glorious appearing of the great God and our Saviour Jeſus Chriſt;

Verſe 14. Who gave himſelf for us, that he might redeem us from all iniquity, and purify unto himſelf a peculiar people, zealous of good works.

Hebrews, Chapter 4.

VERSE 16. Let us therefore come boldly unto the throne of Grace, that we may obtain mercy, and find grace to help in time of need.

Psalm 9.

VERSE 17. The wicked ſhall be turned into hell, and all the nations that forget God.

John, Chapter 5.

VERSE 28. Marvel not at this: for the hour is coming, in the which all that are in the graves ſhall hear his voice.

Verſe 29. And ſhall come forth: they that have done good, unto the reſurrection of life; and they that have done evil, unto the reſurrection of damnation.

2 Corinthians, Chapter 5.

VERSE 10. For we muſt all appear before the judgment-ſeat of Chriſt, that every one may receive the things done in his body, according to that he hath done, whether it be good or bad.

Matthew, Chapter 25.

VERSE 34. Then ſhall the king ſay unto them on his right hand, 'Come, ye bleſſed of my father, inherit the kingdom, prepared for you from the foundation of the world.'

Verſe 41. Then ſhall he ſay alſo unto them on his left hand, 'Depart from me, ye curſed, into everlaſting fire, prepared for the devil and his angels.'

Verſe 46. And theſe ſhall go away into everlaſting puniſhment: but the righteous into life eternal.

A poetical Epitome

OF

G R A M M A R.

GRAMMAR, my pretty boy, by rules does teach
The ſtrict proprieties of ev'ry ſpeech:
Inſtructs to ſpeak and read, with proper grace;
Correctly write; and elegance to trace.

There are ten kinds of words, in the Engliſh language: namely,

Article,	Participle,
Noun,	Adverb,
Pronoun,	Conjunction,
Adjective,	Prepoſition,
Verb,	Interjection.

Article.

THE articles are three, as moſt agree;
And here they follow, *a*, *an*, and *the*.

Nouns.

NOUNS (called ſubſtantives) expreſs we find,
All objects of the ſenſes, and the mind.
In nouns we three peculiar ſpecies trace;
Fitting all ſubſtances in ev'ry caſe:
And among them ideal beings place.

Proper Nouns.

ALL proper nouns one of a kind expreſs;
As it was Adam made us all tranſgreſs.

Common Nouns.

OF ev'ry kind, theſe nouns expreſs the whole;
As, man, bird, beaſt, fiſh, inſect, reptile, fowl.

Number.

TWO numbers we diſtinct in nouns explore;
The ſingular means one; the plural more:
As man is ſingular, becauſe but one;
But men and horſes into plurals run.

Gender.

TWO genders ſtill in ev'ry tongue prevail,
Expreſſive of the female and the male:
The maſculine, as man, betokens he;
The feminine, as woman, meaneth ſhe:
Nouns without life, we neuter genders call;
As organ, penknife, map, book, ſwing or ball.

Pronouns.

WE, proper names for pronouns, oft' reſign;
As, you and I, ſtand for your name and mine.

Perſonal Pronouns.

IN nouns three perſons each grammarian ſeeks:
The firſt, as I, and me, is he that ſpeaks:
The ſecond is the perſon ſpoken to;
And is expreſs'd by thou, and thee, and you:
The third does perſons ſpoken of ſuppoſe;
As he, ſhe, it, him, her, they, them, theſe and thoſe.

Adjectives.

ALL nouns in proper adjectives we dreſs,
Which each peculiar property expreſs;
As a *good* man, *black* horſe, a *jolly* boy;
An *entertaining* book, or *pretty* toy.
By three degrees we adjectives compare
The firſt is poſitive, as you are *fair*;
The next, or the comparative, does ſhow,
That Fanny Baas is *fairer* ſtill than you:

But

But the ſuperlative, or third degree,
Says, I'm the *faireſt* creature that can be.
Again, we may compare with more and moſt;
As you are *fair*, and famous as a toaſt:
But with comparative degree compare,
You'll find another fairer, or *more fair:*
By the ſuperlative it is decreed,
That I'm the faireſt, or *moſt fair* indeed.

Verbs.

VERBS (called affirmations) ſerve to ſhew,
You ſuffer, or exiſt, or ſomething do;
In ſhort, in affirmations you may find
All actions of the body, or the mind.
Three times, the ſenſe of affirmations bound;
And are in preſent, paſt, and future found.

The paſt time e'er diſplays a ſomething done;
As, yeſterday I play'd at taw, and won.

The preſent time, denotes the preſent, now;
As, I am writing; or, I write; I bow.

The future time, ſomething to come explains;
As, I'll teach you—that is, if you'll take pains.

Participles.

FROM verbs come participles; and thoſe in *ing*
Are active call'd; as, verb to love, lov-*ing*:
Others are paſſive call'd; and end in *ed*;
As, verb to love; participles, lov-*ed*.

Adverb.

THE adverb, which ſome quality beſtows,
The manner of the affirmation ſhows;
As if I play'd with Charley, or with Bill,
Perhaps you'll ſay, I play'd extremely ill:
Or if I ſaid my leſſon, you may tell,
Like a good boy, I ſaid it *very* well.

Prepositions.

FORCE to expreſſion prepoſitions grant;
And give to nouns that energy they want.
Them, before nouns in general, we find;
Tho' now and then, perhaps, they're plac'd behind;
As, I was over hills and vallies ſent:
Over denotes the manner how I went.

Conjunctions.

CONJUNCTIONS, words or ſentences do join;
Explain the meaning, or the ſenſe refine:
As, John *and* Robert went, like fools, to fight;
But, tir'd of cuffing, left off ere 'twas night.

Interjections.

THE interjection, of ſurpriſe combin'd,
Denotes ſome ſudden paſſion of the mind:
Some ſtrong emotion of the feeling ſoul;
When all the thoughts are brought beneath controul;
As, ah! alack! alas! ah! well-a-day!
O! let me find a purſe—O! that I may.

OF
THE RIGHT PUTTING TOGETHER OF WORDS

In a Sentence,
CALLED, SYNTAX.

SYNTAX, by certain rules, diſtinctly ſhows,
How we, with eaſe, may ſentences compoſe:
Reſpecting ſentences, two things are found;
They're either formed as ſimple, or compound.

A ſimple

A ſimple ſentence is, where but one name
Joins to an affirmation; as, Seek fame:
Two ſentences a compound ſentence make:
Thus, If you're good, you'll ſurely have a cake.

Rules of Agreement.

1. In number and in perſon muſt agree
The noun and verb; as, little George loves me.
2. A noun of multitude; the crowd's in haſte,
Is better in the ſing'lar number plac'd.
3. The adjective and ſubſtantive muſt ſtill
Agree together; as, a gilded pill.
4. Two nouns (when a conjunction comes between)
Have a verb plural; as under may be ſeen:
William and Frederic *love* our noble Queen.

Letters to a Pupil,

ON IMPROPRIETIES;

FREQUENT IN

WRITING AND CONVERSATION.

Dear Charles,

THE preſent is an age of liberal inquiry; and the importance of intellectual improvement is ſeldom controverted. Some ſordid individual, perhaps, may *condeſcend* to inform us, that learning is uſeleſs, becauſe *we can do without it.* "I knows enough to write out an account for goods; and how to indite a letter; and every thing of that ſort, as one may ſay: and as to any more than that, I don't care one farthing about it; not I. As to your learning, and your grammar, and all that, what good will it do to me? I have often heard Will Leatherhead ſay, as how riches is the main chance: and it is true enough for the matter of that: for what is a man without money? When I goes upon 'Change to do my buſineſs; I ſee plainly enough, that it is money that carries the day; and therefore, do you ſee, give me the caſh, and let who will take your learning." Such is the uſual tone of argument

ment with thoſe who have no ideas, but what ariſe from the purchaſe and ſale, the weight and admeaſurement, of the various articles of trade. Their reaſoning is not entitled to an elaborate confutation; and I will only obſerve, if our purſuits are to be limited to that which is *abſolutely neceſſary*, we ought to reſign, not only the elegancies of life, but even many of it's conveniencies. You have often heard me ſpeak of the advantages of education; and you know, without it the moſt noble endowments may be buried in obſcurity; and like unpoliſhed gems, have value without luſtre, and excellence without uſe.

> "Full many a gem of pureſt ray ſerene,
> The dark, unfathom'd caves of ocean bear;
> Full many a flower is born to bluſh unſeen;
> And waſte it's ſweetneſs on the deſert air."

Human communication, my dear Charles, is the grand ſource of ideas; and to the multitude it is the only ſource. To combine and diverſify the accumulated wiſdom of ages is eaſy: to inſtruct the world by felicity of invention, is the lot of few. But if ſcience be ſo valuable, and genius ſo rare, we never can be ſufficiently grateful to Almighty God for *ſpeech*, that divine ſcheme for the conveyance of ſentiment, and the eſtabliſhment of general intercourſe—the parent, or the friend, of all that adorns and delights the ſoul of man. And hence

hence the utility of theſe letters: for without *preciſion* of language, there can be no *preciſion* of idea. Law would appear unintelligible jargon; and the ſublimeſt conceptions of the philoſopher, a maſs of abſurdities. This admitted, I need not queſtion your conviction of the uſe of verbal criticiſm. But it may not be improper, firſt to give a few extracts from ſome authors of name and integrity. However, I have already written a long letter: you therefore muſt have patience, till you hear from me again.

Adieu.

Dear Charles,

Cicero ſays, It is of the higheſt importance to ſpeak with propriety; and Quintilian obſerves, All excellence in writing and ſpeaking is founded on grammatical knowledge. They, who treat this knowledge as either trifling, or unpleaſant, merit contempt; for the fabric that is raiſed on any other foundation, ſoon falls. It is neceſſary in youth, pleaſing in age, and a delightful companion in retirement; and, contrary to *all* other ſtudies, it has more utility than oſtentation. They who engage in this important purſuit, will find it not only adapted to expand and invigorate the powers of youth, but to exerciſe the profoundeſt erudition and the moſt exquiſite taſte.

Mr. Locke ſays, Language being the means whereby men convey their diſcoveries, reaſonings, and knowledge from one to another, he that uſes words without any clear and ſteady meaning, leads himſelf and others into error. Moſt of the diſputes in the world would end of themſelves, and immediately vaniſh, if the words that are uſed in them were defined and reduced to a certain ſignification.

Lord Chesterfield. If it be neceſſary to attend ſo particularly to our *manner* of ſpeaking, it is much more

more ſo, with reſpect to the *matter*. Fine turns of expreſſion, a genteel and correct ſtyle are ornaments, as requiſite to common ſenſe, as a polite behaviour, and an elegant addreſs are to common good manners. Even trifles elegantly expreſſed will be better received than the beſt of arguments, homeſpun and and unadorned. Be careful then of your ſtyle upon all occaſions; whether you write or ſpeak, ſtudy for the beſt words and the beſt expreſſions, and, if you are in doubt concerning the propriety or elegance of any word, have recourſe immediately to ſome good author on the ſubject: if you be not ſparing of your trouble, to write and ſpeak well, will ſoon become habitual.

Dr. Priestley. The propriety of introducing the Engliſh grammar into ſchools cannot be diſputed: a competent knowledge of our own language being both uſeful and ornamental in all; and a critical knowledge of it *abſolutely neceſſary* to perſons of a liberal education.

Dr. Blair. Whatever the advantages or defects of the Engliſh language be, as it is our own language, it deſerves a high degree of our ſtudy and attention, both with regard to the choice of words which we employ, and with regard to the arrangement of theſe words in a ſentence. And again—

The

The many errors, even in point of grammar; the many offences againſt purity of language, which are committed by writers, who are far from being contemptible, demonſtrate, that a careful ſtudy of the language is previouſly requiſite in all who aim at writing it properly. He who is learning to arrange his ſentences with accuracy and order, is learning at the ſame time, to think with accuracy and order; and this alone will juſtify all the care and attention we can beſtow.

We cannot reflect on the wonderful power of language, without the higheſt admiration. What a fine vehicle is it now become for all the conceptions of the human mind; even for the moſt ſubtile and delicate workings of the imagination! From being a rude and imperfect interpreter of men's wants and neceſſities, it has now paſſed into an inſtrument of the moſt delicate and refined luxury. We admire ſeveral of the inventions of art; we plume ourſelves on ſome diſcoveries, which have been made in latter ages to advance knowledge, and to render life comfortable; we ſpeak of them as the boaſt of human reaſon: but certainly no invention is entitled to any ſuch degree of admiration as language.

I confeſs, my dear boy, that theſe extracts are rather long; yet, I hope, you will often read them, and believe I am, very ſincerely,

Yours.

My dear Pupil,

I RECEIVED your clever letter yesterday; and am pleased that you like the extracts. Indeed, the importance of a correct mode of expression in business, is sufficiently obvious. Shopmen, clerks, apprentices, and all who are engaged in the transactions of commercial life, may be assured, that the acquisition will procure them respect, and be highly conducive to their advancement in life.

In a country, therefore, where the industrious may become affluent, and the affluent ascend to the chief employments of the state; it is certainly wise to attain the best education that circumstances will admit.

I shall give you my remarks in distinct sections; that you may recur as often as you please to any difficult or favourite section, without embarrassment of ideas, or needless repetition of passages, already understood.

The mind of man, as Dr. Johnson judiciously observes, by such short, but vigorous flights, soon reaches the summits of human intelligence.

I remain your's.

Dear Boy,

I SHALL now begin my remarks; and first, Of the agreement between verbs and nouns. The force of habitual expression is the only apology which can be admitted for the violation of the laws of agreement. But this apology is to be restricted to familiar conversation. In letters, in public orations, and in compositions for the press, the transgression is highly disgraceful: and the presumption, that the public will pardon our negligence, on the plea of "attention to *things* rather than to *words*," is at once indecent and absurd.

The First Section.

SINGULAR FOR THE PLURAL.

1. *IN the British army, in time of peace, there* IS *seventy-two regiments of foot.* DR. TRUSTLER.

2. *The powers of lightning, when accompanied with thunder,* IS *great and wonderful.*

DR. TRUSTLER,

3. *The battle of Fontenoy, on April* 30*th*, 1745, *was one of the bloodiest in the age. The prodigies of*

of valour exhibited by the English infantry, WAS *the astonishment of mankind.* ANN. REGISTER.

4. *Her eyes* WAS *put out, when a child; and she was carried about, by a beggar woman, to excite charity.*

5. *The streets* IS *so dirty, that my shoes* ISN'T *fit to be seen.*

6. *This day* IS *published, Memoirs of the King of Prussia, &c.* ADVERTISEMENT.

7. *The monstrous Craws, or wild human beings,* IS *to be seen in the Hay-market.*

In the above instances it ought to be ARE, not IS: for *monstrous Craws, Memoirs, shoes, streets, eyes, prodigies,* and *regiments* are plural.

8. *When I told you, that sixteen ounces of gold would gild a quantity of silver wire, sufficient to circumscribe the globe, you* WAS *surprised.*

9. *You* WAS *in earnest, and you sought attention.* DR. BLAIR.

This use of the word *you* is indefensible. It requires a verb plural. The learned Professor might write, with equal propriety, You *is* in earnest. You *seeks* attention.

10. *When an East-wind and West-wind* RAGES, *and* MEETS *each other with fury, they excite whirl-*

winds, tempeſts, and hurricanes, which ſweep away all before them. DR. TRUSTLER.

11. *The zeal and amity of his phyſical friends,* SEEMS *to have rendered them very careful of doing enough for him.* DR. KIRKPATRICK.

It is a received opinion among ſome grammarians, that any two nouns, which expreſs ſynonymous ideas, may be uſed in conſtruction, with a verb ſingular. But if the ideas are ſynonymous, one of them is unneceſſary; if they are diſtinct, reaſon and analogy demand a plural. In either caſe, it is a blemiſh in compoſition. It is indiſputably more correct and elegant to aſſociate a verb plural with two nouns; and it has this advantage—be the words ſynonymous or not, you cannot err.

It is a law of compoſition, not to incumber your ſentences with ſuperfluous words. If the Doctor mean the ſame by *amity*, which he does by *zeal*, he has broken this law. If he deſire to convey diſtinct ideas by the terms, the expreſſion is not Engliſh. I ſhould be expoſed to infinite contempt, were I to write, The King and his Majeſty *is* to reſide this ſummer at Windſor. If I urge in my defence, *King* and *Majeſty* are ſynonymous, the reply would be, then one muſt be ſuperfluous. Were I to admit that *King* refers to a foreign ſovereign, on a viſit at the Court of London, *any* ſchool-boy would

would inform me, that I had written falſe grammar; yet it would certainly be as correct as, *Two winds meets*; in the 10th inſtance.

It is a very common error, eſpecially in ſpeaking, to uſe there *is*, inſtead of there *are*; and here *is*, for here *are*.

12. THERE'S *your ſhoes*, HERE'S *your boots*.

13. *When their vices forſake* them, THERE'S *many flatter themſelves, that they have forſaken their vices*.

Be careful to avoid ſuch improprieties; and reſt aſſuredly, I am,

Your's.

Dear Charles,

To record important revolutions, is the province of the hiſtorian; to detail civil and domeſtic occurrences, is the lot of all. It is, therefore, incumbent on all, to aim at a clear, agreeable manner of relating the common incidents of life. The feelings of the company, we may be aſſured, are exceedingly hurt, when two-thirds of the words employed on the occaſion conſiſt of *ſays I*; and, *ſays he*;

he; and, *so says I*; and, *so says she*. It is the best evidence of a happy talent in communicating information, when you make, by your tones and gestures, the repetition of such phrases unnecessary. And I must remind you, that the expression *says I*, not only has an unpleasant, hissing sound, in common with, *says he*, and *says she*; it is also a solecism: e. g.

15. *If there were no tale-bearers,* SAYS I, *contention would cease.*

That is, were there no tale-bearers, I *says* contention would cease. You may easily avoid both the harshness and the impropriety, by substituting *said I*, and *said he*.

The historian may be indulged in the use of, *says he*, if he *suppose* it will exhibit an event to greater advantage: e. g.

16. *Mr. Cole, our consul at Algiers, complained to the Dey, of the injuries which British vessels received from his cruizers. His* REPLY *was fair and ingenuous; the Algerines,* SAYS HE, *are a company of rogues, and I am their captain.*

It deserves notice, that there is no *elegance* in using SAYS, on this occasion; and it is still more remarkable, that there is no necessity for using it at all. Were it omitted, there would be far more grace

grace and energy in the expreſſion. It is now feeble tautology—he *replied*, the Algerines, *ſays he*, are a company of rogues. But if it be unneceſſary in a *written* narrative, it is inſufferable in an anecdote, delivered, *vivâ voce*. He is a lifeleſs ſpeaker, for inſtance, with no inflexion of voice, no variation of tone, who is under the neceſſity of uſing the phraſe, *ſays he*, to inform his audience, that the Dey is the perſonage who ſpeaks. It may alſo be remarked, that *anſwer* would be more proper here, than *reply*. *I* ſpeak; *you* anſwer. *I* reply; *you* rejoin.

I beg you will often read theſe obſervations; as ſome care has been taken to render them familiar. Adieu, my dear boy, be diligent, be virtuous, and you will be happy.

Dear Pupil,

HAVING in my former letters noticed many paſſages, where the ſingular has been uſed for the plural; I ſhall now paſs my obſervations on a few others, in which you will find the

Plural for the Singular.

1. *No officer* DARE *contradict, diſpute, or diſobey the orders of his ſuperior officer.*

DR. TRUSTLER.

2. *The camel eats little, and lives commonly fifty years. To make it go on, the driver* NEED *only whistle or sing.* JOURNEY INTO EGYPT.

As officer is not a plural noun, it ought to be DARES. And for the same reason, NEEDS: e. g.

3. *I have seen an ostrich swallow bullets burning-hot from the mould, which no other animal* DARES *to do.* DR. SHAW.

4. *I dare do all that does become a man;*
Who DARES *do more is none.*
SHAKESPEAR.

5. *If weevils infest the corn, the farmer* NEEDS *only put a lobster or two on the heap, and in less than four hours, the weevils will quit the barn or perish.* LETTERS ON AGRICULTURE.

6. *Allow not nature more than nature* NEEDS.
SHAKESPEAR.

The expression *were it* is very proper. It is conditional, and may be varied by *if*: e. g.

7. WERE IT *not for the fixed stars, it would be extremely difficult, if not impossible, to prove the annual motion of the earth.* DR. GOLDSMITH.

8. IF IT WERE *not for the fresh air, which is let into the pond, fishes would die, when the surface is frozen.* DR. GOLDSMITH.

But

But the expreſſion IT WERE, without any hypotheſis or condition annexed, is inadmiſſible: e. g.

9. IT WERE TO BE WISHED, *that men would lay aſide all fooliſh projects, and conſult the real happineſs of themſelves and their neighbours.*

We ſhall be convinced of the impropriety of this conſtruction, by prefixing *if* to the words *it were to be wiſhed.* The ſenſe is not complete; for it is a poſitive unconditional propoſition; and it ought to be in the mode, which grammarians term, the indicative. *It* IS *to be wiſhed that men would lay aſide all ſilly projects,* is the proper expreſſion.

The phraſe, *I could wiſh,* is equally exceptionable, when the ſentence is unconditional. The error is not in point of concord; yet I chooſe to notice it under the preſent ſection.

10. I COULD WISH *the greatneſs of a man was eſtimated according to his virtue and abilities.*

The author ſhould have written, *I wiſh* the greatneſs, &c. There is no hypotheſis, or reſerve, to juſtify the admiſſion of *could.* In the following inſtance, indeed, and upon all ſimilar occaſions, it is proper and neceſſary.

11. *He*

11. *He has so provoked me,* I COULD WISH *him dead.* I COULD *kill him, were he not my child.*

The distinction is obvious. In the former instance, if we reject *could*, the expression will be full and nervous: if we dismiss it from the latter instance, it will indicate a wish that had no existence in the father's breast. Though he has so grievously provoked me, I do not desire his death—paternal feelings arrest my vengeance.

12. *The sun is in the center of our system; the planets which move round him are seven in number; and their names are as* FOLLOW: Mercury, Venus, the Earth, Mars, Jupiter, Saturn and Georgium Sidus.

It ought to be *follows*. Their names are as it here follows—as the account which follows. On most occasions it is more elegant to omit *as follows*. Were you asked the name of a man of war, it would be ridiculous to answer, *it is as follows*, the Alfred. If the question extended to several ships, it would be equally unnecessary to say, they are *as follows*, the Ganges; the Triumph; the Irresistible.

In justification of the phrase, it may be urged, that the true construction requires *follow*. The names are as *they follow*.

To

To which I reply, *as*, is a term of ſimilitude: and the expreſſion, *as they follow*, implies that the names are like themſelves! But the names are AS, or LIKE the *account*—as, or like the *ſtatement* which follows.

13. *The Cape of Good Hope, as well as many iſlands in the Weſt Indies,* ARE *famous for hurricanes,* GOLDSLITH.

The Cape of Good Hope ARE!

14. *It is praiſe-worthy to abſtain from injury; but that* A'NT *enough; you muſt alſo learn to do good.*

A'nt ought to be avoided; even when the conſtruction admits a verb in the plural number. In the phraſe before us, it makes a diſgraceful ſoleciſm. To abſtain from injury is praiſe-worthy; but that *are not* enough.

Let it be remembered by thoſe economiſts, who deſire to ſave ink and breath, by a prudent abbreviation of their phraſes, that *a'nt* is the plural contraction, and *is'nt* the ſingular.

15. *There* ARE *a great variety of wines, which differ in colour, taſte, quality and duration.* DR. TRUSTLER.

Variety

Variety is not a plural noun, any more than quality, or duration.

Here ends my firſt ſection, and a very long letter, which you will do well to peruſe, as often as convenient.

Be not diſcouraged, if you find a little difficulty on a firſt reading. Perſevere. The whole will ſoon become familiar; and you will be amply rewarded for your attention.

I am ſincerely your's.

THE SECOND SECTION.

Dear Charles,

I SHALL begin my ſecond ſection with remarks on the conſtruction of verbs with nouns.

When the word TO is prefixed to a verb, that verb is ſaid, by grammarians, to be in the infinitive mode; and to conform to the ſame rules of government as the noun: e. g.

1. TO ERR *is human*; *to forgive divine.*

To

To and *err* convey the ſame idea as *error*; and on that account, the verb which follows muſt be in the ſingular number.

And the ſame conſtruction is proper, though the infinitive mode be followed by ſeveral other words: e. g.

2. *To be in a paſſion,* IS *to puniſh yourſelf for the faults of other people.*

Here are not fewer than five words before *is*; but as they include only a ſingle idea, *paſſion*, the ſentence is correct.

3. *To be a benefactor to mankind, by propagating knowledge, requires ſome qualities not univerſally beſtowed: but* TO SPREAD *ſuſpicion*; TO INVENT *calumnies*; TO PROPAGATE *ſcandal*; REQUIRES *neither talents, nor labour, nor courage.*

It is here moſt truly and properly affirmed, that to ſpread ſuſpicion requires no talents; to invent calumnies requires no talents; to propagate ſcandal requires no talents. But obſerve, the admiſſion of *and* between the infinitive modes renders the conſtruction ungrammatical: e. g.

4. *To be rich* AND *to be noble* IS *not ſufficient to procure the eſteem of worthy men.*

If *and* were omitted, the paſſage would be accurate. *Affluence* is not ſufficient to procure the eſteem of worthy men; *nobility* is not ſufficient to procure the eſteem of worthy men; for a man may be affluent without nobility, or enobled without affluence; and, in either caſe, be denied the eſteem of worthy men. But it is obviouſly the author's opinion, that nobility and affluence *united*, are ſufficient to procure eſteem; and therefore reaſon and the idiom of our language demanded a verb plural.

On ſubjects of importance, it is better to be diffuſive than defective. I, therefore, repeat my former remark: whenever *and* occurs between two nouns, or two infinitive modes, the verb *muſt be* in the plural: even when the attribute may be affirmed of each noun ſeparately; and on that account, if the *and* be omitted, it is always more *ſafe*, and frequently more *elegant* to inſert it: e. g.

5. *Temperance, juſtice, fortitude,* IS *a virtue.*

The full conſtruction is—temperance is a virtue, juſtice is a virtue, fortitude is a virtue. In the abbreviated conſtruction, the attribute and affirmation are omitted after temperance and juſtice; and, as there is no *and* in the ſentence, the verb continues in the ſingular, after no fewer than three nouns. The author might have written—*temperance, juſtice,*

AND

AND *fortitude* ARE *virtues*. The *and* is never omitted to advantage, except after infinitive modes: becauſe verbs ſingular are never elegantly uſed after ſeveral *nouns*, though they are frequently graceful after ſeveral *infinitives*.

But take particular notice, if one of the nouns be plural, it is indiſpenſably neceſſary to uſe a verb plural, though there be no *and* in the ſentence, and though the noun which immediately precedes the verb be ſingular: e. g.

6. *The ſtars, the ſun* PROCLAIMS *his praiſe.*

How much more eaſy and natural it is to ſay, the ſun and ſtars proclaim his praiſe! When we depart from eſtabliſhed modes of expreſſion, it is incumbent on us to prove, that we have reaſon and analogy to countenance our diſſent. Admitting that the ſun PROCLAIMS the praiſe of God, it may be demanded, what are the ſtars doing? It cannot be anſwered, THEY alſo PROCLAIMS his praiſe, for that is an error in concord. Nor can it be pleaded, that PROCLAIM is underſtood; becauſe it is a rule founded on the nature of things, that a verb plural cannot be underſtood of a former noun, if a verb ſingular be expreſſed with the latter. It might have been written—the ſun, the ſtars PROCLAIM his praiſe;

praiſe; for an individual may be included in a multitude, but not a multitude in an individual. *Proclaims* relates to *one*, *proclaim* to *many*.

The clock proclaims the noon of night.

Farewell.

Dear Boy,

NOTHING will ſo effectually expand and invigorate the powers of the mind, as CLOSE THINKING. Hence it is of the greateſt conſequence to form an *early habit of reaſoning*. It was an exceſs of modeſty, perhaps, in Sir Iſaac Newton, to attribute his glorious diſcoveries to *patient attention*; but certainly, attention without genius, is preferable to genius without attention. It is not the time which a ſtudent ſpends at his books, but the art of confining his attention, of concentering the powers of his mind to the buſineſs before him, which conduces to his real progreſs.

Now let me requeſt you to turn your attention to a paſſage in Dr. Blair's Lectures on Rhetoric. *What the heart, or the imagination* DICTATE, *always*

always flows readily. We never uſe *or* in the ſenſe in which it is here employed. Dr. Johnſon, indeed, informs us, that *or* is a conjunction; and he adds, it is disjunctive. What an aſſociation of ideas! A *disjunctive conjunction!*

I am not competent to determine what impreſſions are made by *and*, and by *or*, on our friends, *North of the Tweed*, but with us, the moſt illiterate perceive the difference in a moment. A homely example will anſwer our purpoſe. In a country fair, if you ſay to a peaſant, intruſted with the ſale of ſome horſes, *I will give you twenty guineas for this horſe* AND *that*, the terms of purchaſe will be inſtantly comprehended, and the man will properly conclude, that he muſt deliver TWO horſes, on receipt of the twenty guineas. If you ſay, *I will give you twenty guineas for this horſe* OR *that*, he will immediately underſtand, that he is to receive twenty guineas on delivery of EITHER of the horſes.

In England, a ſcholar expreſſes himſelf in this manner; *What the heart* AND *the imagination* DICTATE, *always flows readily. What the heart* OR *the imagination* DICTATES, *always flows readily.* That is, what either the heart dictates, or the imagination dictates, always flows readily. There is preciſely the ſame impropriety (as to the analogy of

 language)

language) in demanding a verb plural after OR, on the present occasion, as there would be in demanding two horses of the countryman instead of one.

Again from Dr. Blair, *An ostentatious, a feeble, a harsh, or an obscure style* ARE *always faults; and perspicuity, strength, neatness, and simplicity* ARE *beauties.*

The first clause of this sentence, namely, *An ostentatious, a feeble, a harsh,* OR *an obscure* STYLE ARE *always* FAULTS, may be pronounced inelegant, in every view. It's only merit consists in being an illustration of that *harshness* and *imbecility* which the Professor condemns.

Style is the nominative case; and if a thousand adjectives were before it, either connected or unconnected, a verb plural would be improper; for the words, *An ostentatious, and a feeble, and a harsh, and an obscure* STYLE, are only equivalent to *a* STYLE *ostentatious, and feeble, and obscure.*

The greater PART *of* MANKIND ARE *corrupt in every condition; and differ in high and in low stations, only as* THEY *have more or fewer opportunities of gratifying their desires.*

Grammarians inform us, that certain nouns, which

which they denominate *collective nouns*, may be construed with a verb either *singular* or *plural*. But this is speaking at random, and contrary to the order and precision of nature. Let us examine this opinion.

There ARE *a* MULTITUDE *of men. There* ARE *a* FLIGHT *of birds. The* ASSEMBLY ARE *numerous. The* MULTITUDE ARE *great.*

As it is impossible to affirm of each man, that he is a MULTITUDE; of each bird, that it is a FLIGHT; of each member of the assembly, that he is NUMEROUS; of each individual, that he is a GREAT MULTITUDE; the verb ought to be singular, to correspond with the unity of the terms, *flight, multitude, assembly.*

The *singular* is frequently inelegant and unnatural: e. g.

I have compassion on the MULTITUDE, said the Redeemer, *for* THEY HAVE *nothing to eat.*

It is here affirmed of each individual of the multitude, that he has nothing to eat; and there being MANY individuals, the verb and pronoun would be incorrect if used in the singular.

A verb in the SINGULAR form is improper,

 when

when the word PART precedes a COLLECTIVE term.

A COMMON noun is incapable of being divided, without loſing it's nominal eſſence; as a CIRCLE, a SWARM, an ORANGE. A COLLECTIVE noun is the bond which keeps many individuals in a ſtate of union; as a FLIGHT of birds; a FLOCK of ſheep; or a MULTITUDE of men.

If a multitude be ſeparated into parts, every part will contain perfect individuals. But a ſegment is not equal to a circle; nor does a wing conſtitute a ſwan. Hence it is manifeſt, if the word *part* precede a COMMON noun, the verb muſt be *ſingular*: e. g. *The greater* PART *of that orange is decayed.* If it precede a *collective* noun, the verb ought to be *plural:* e. g. *The greater part of mankind are corrupt in every condition.* It is a diſtreſſing truth, but expreſſed with preciſion and elegance.

Adieu.

Dear Charles,

I THINK you are now pretty well prepared to underſtand THE RULES OF CONCORD; and therefore ſhall immediately give you ſome with examples.

1. When the nominative is numerically ONE, the verb muſt be ſingular: e. g.

God IS *love.*
Learning EXCELS *riches.*
To obey God IS *liberty.*
To be governed by paſſion IS *ſlavery.*

2. When the nominative is plural, the verb muſt be plural: e. g.

Good men HATE *ſin from the love of virtue.*

3. When TWO or more nouns, or *two* infinitive modes, joined by *and*, are the nominative caſe, the verb muſt be *plural*: e. g.

Soft words and hard arguments ARE *the beſt weapons in controverſy.*

This mode of conſtruction is natural and elegant. Dr. Prieſtly's apology for a verb ſingular, when the terms contain *kindred ideas* is inadmiſſible. Kindred terms enfeeble the ſtyle. They are avoided

by all, who ſpeak with elegance and preciſion. If uſed, they ought to conform to the general laws of ſyntax. They are not *one word*, becauſe they contain kindred ideas. The Doctor might as well contend, that the Prince of Wales and the Prince of Denmark *is* one man, becauſe they are *couſins*.

I do not know that any terms are more ſynonymous than *one* and *one*. Are they, on that account, only *one?*

I recommend an invariable obſervance of this rule. It is hazardous to deviate from it; and, in my opinion, abſurd.

4. When *two* or more nouns, of the ſingular number, not joined by *and*, are the nominative caſe, the verb may be either ſingular or plural: e. g.

Omnipotence, juſtice, mercy IS *an attribute of God.*
Omnipotence, juſtice, mercy ARE *attributes of God.*

5. If the nouns unite in the production of the attributes, the verb muſt be plural: e. g.

Faith, practice, perſeverance FORM *the Chriſtian.*

6. If either of the nouns be *plural*, the verb muſt abſolutely be *plural*, though unconnected by *and*; and though the attribute may be affirmed of each noun ſeparately: e. g.

Powers,

Powers, riches, fame, ARE *of uncertain duration.*

7. When *two* infinitive modes, not joined by *and*, are the nominative caſe, the verb is more elegantly uſed in the ſingular, than in the plural: e. g.

To oppreſs the defenceleſs, to inſult the afflicted, BETRAYS *a mean and cruel mind.*

This, my dear boy, finiſhes the 2d. ſection: and with every good wiſh,

I am your's moſt ſincerely.

THE THIRD SECTION.

Dear Charles,

I BEGIN the third ſection, with remarks on words and phraſes, elegant and vulgar.

Grammatical conſtruction conſtitutes the firſt excellence of ſtyle.

A happy ſelection of words is the foundation of the ſecond excellence.

Take care, therefore, that your diſcourſe be neither deformed by *ſoleciſms*, nor diſgraced by low and vulgar *words*; for nothing is ſo diſtinguiſhing a characteriſtic of low company, and bad education, as *vulgariſms*.

I hope you are ſufficiently informed as to the *conſtruction* of verbs. I now proceed to enumerate a few verbs which merit preference in point of elegance and preciſion.

Cut a Figure.

To *make* a figure; to *make* an appearance, handſome or mean, are polite expreſſions.

You are not angry with me for thoſe JOKES *which I* CUT *upon you yeſterday; are you?*

In figurative language, a perſon may be ſaid to *cut a figure*, in alluſion to the buſineſs of a *carver*.

But

But if this be condemned as unpolite, ſurely *to cut a joke* ought to be caſhiered as extremely vulgar. *To* PASS *a joke, to paſs cenſure, to paſs compliments on a perſon*, are proper.

To CRACK A JOKE. This phraſe is equally vulgar. It is uſed, I admit, by Pope; *He takes his chirping pint, and* CRACKS *his joke.* But you muſt obſerve, that poets often adapt their language to the ſtate of the perſon introduced. Hence the moſt polite, and the moſt vulgar diction, may be found in the ſame poem.

In noticing the jocoſe propenſity of a perſon, do not ſay, *He is fond of* CRACKING *his jokes*; but, *He is* JOCOSE; *He* LIKES *to joke*; *He is fond of* SPORTING *a joke*; for this is deſcriptive of a propenſity to enliven diſcourſe, by a witty and unexpected combination of ideas. But if his pleaſure conſiſt in *perſonal attack*, do not ſay, *He loves to* CUT *a joke upon a friend*, but, *He loves to* PASS *a joke upon a friend*; *He takes pleaſure in* POINTING *a jeſt at a friend.*

To *paſs* ſentence and to *pronounce* ſentence are ſynonymous. To *addreſs* a ſentiment to a perſon, and to *point* a ſentiment to a perſon, are alſo ſynonymous and proper. But how a *remark* is to be *cut* and *crackt* I know not.

Do you ſee.

SOUNDS are conveyed through water, DO YOU SEE, *with almoſt the ſame facility with which they move through air.*

It is by no means unpolite to requeſt a perſon to inform you, whether he perfectly *comprehends* the terms of a queſtion, or has a perfect *conception* of the ſubject in debate; but it is exceeding unpolite to reiterate *Do you ſee* in the ſequel of your narrative, or the progreſs of your arguments. Suppoſe I were explaining to you the circumſtances of the death of General Wolfe, as they are repreſented on his monument in Weſtminſter Abbey, would it not be ſomewhat extraordinary, if I aſked you, at every third word, *Are you blind?* e. g.

The expiring hero is attended by his aid-de-camp. Before him, *Are you blind*? is an Indian chief. That ſoldier, *Are you blind?* is ſhouting victory.

If diſtance, or the ſhades of night involve the object in obſcurity, to which you deſire the attention of

of a companion; and if you requeſt to know whether his external eye is adequate to diſtant and difficult diſcrimination; in other words, whether he can SEE *the object*, it is no proof that you are deficient in breeding. But it is inſufferable rudeneſs to queſtion, every moment, the vigour and penetration of his mind.

Obſerve then, that, *Says I*, and *ſays ſhe*; *So ſays I*, and *ſo ſays he*; *You ſee*, and *don't you ſee*; *You know*, and *don't you know*; *And ſo as I was ſaying*, *&c.* are to be avoided by all, who aim at decency of expreſſion.

Adieu.

Dear Pupil,

Now for the capital vulgariſm,

I have got.

I GOT *on horſeback within ten minutes after I received your letter. When* I GOT *to Canterbury,* I GOT *a chaiſe for town. But* I GOT *wet through before* I GOT *to Canterbury, and* I HAVE GOT *ſuch a cold, as I ſhall not be able to* GET *rid of in a hurry.*

I GOT

I GOT *to the Treasury about noon, but first of all* I GOT *shaved and drest. I soon* GOT *into the secret of* GETTING *a memorial before the Board, but I could not* GET *an answer then; however,* I GOT *intelligence from the messenger, that I should most likely* GET *one the next morning. As soon as* I GOT *back to my inn,* I GOT *my supper, and* GOT *to bed, and it was not long before* I GOT *to sleep. When* I GOT *up in the morning,* I GOT *my breakfast, and then* GOT *myself drest, that I might* GET *out in time to* GET *an answer to my memorial. As soon as* I GOT *it,* I GOT *into the chaise, and* GOT *to Canterbury by three; and about tea time,* I GOT *home.* I HAVE GOT *nothing particular for you, and so Adieu.*

Every phrase in this extract is in popular and perpetual use; and you see, that all the events, from the birth of Time to this moment, may be detailed without the help of a single verb, GET excepted.

This verb is of Saxon origin; ARRIVAL at the place of destination, the primitive idea; hence ACQUISITION; and hence POSSESSION. With the latter idea, it is used improperly in construction with *have. I have* GOT; in other words, *I have* HAVE: e. g.

I HAVE

I HAVE GOT a father ninety years old.

For obvious reasons, *I have got a father* must be restricted to, *I possess*; consequently, it is absurd to prefix *have*; *I have possess!*

It may, therefore, be advanced as a general rule, when *possession* is implied, it is vulgar to use *have* in construction with *got*.

Our ancestors have furnished us with innumerable terms to express all the ideas, which the vulgar affix to their *fac totum—got*.

Are you in quest of any thing? Do not exclaim *I have* GOT *it*. But say, *I have* FOUND *it*; *I have it*, or *Here it is*, &c.

Again. *I mounted* my horse, or *I was on horseback* within ten minutes after *I received* your letter: as soon as *I arrived* at Canterbury, *I engaged* (or *hired*) (or *stept into*) a post chaise for town. *I was* wet through before *I reached* Canterbury, and *I have* (or *I have taken*) such a cold as I shall not easily *remove* (or *cure*.)

I arrived at the Treasury about noon, being previously shaved and drest. I soon *discovered* the secret of *introducing* a memorial to the Board; I could not, however, *obtain* an immediate answer; but

but the meſſenger told me, that I probably ſhould *receive* one, next morning. *I returned* to my inn, *ſup't*, *went* to bed, and *ſlept* well. *I roſe* early, and *dreſt* immediately after *breakfaſt*, that I might be in time for the anſwer to my memorial. As ſoon as *I received* it, *I took* poſt chaiſe, *reached* Canterbury by three, and my home about tea-time. *I have* nothing particular to add. Adieu.

It was not my deſign to paraphraſe the extract in terms of elegance; I only wiſhed to prove, that perſons of common education might expreſs the uſual occurrencies of life, without the aid of *get*, and *got*, and *I have got*, &c.

This house to Let.

This house to be Let.

This house to Lett.

This house to be Lett.

Conciſe forms of expreſſion are very proper in familiar intercourſe, provided they neither cauſe *obſcurity*, nor infringe any *rule* of *grammar*.

The full conſtruction of this example is—*This houſe* IS *to be* LETTED. No obſcurity ariſes from the omiſſion of IS, or from the abbreviation of

LETTED

LETTED—Letted being the ſame to lett, as dreſſed to dreſt. But the T is no leſs eſſential in LETT, than the T in DREST.

The houſe is *paſſive* on this occaſion, and therefore the preſence of BE after TO is indiſpenſable. There is no inſtance in our language, to countenance the omiſſion.

The firſt example is improper, becauſe it makes the houſe ACTIVE. This houſe to let—to let what? The proprietor? This houſe, I preſume, is to BE LETT BY the proprietor.

The ſecond example is improper, becauſe it has the verb active LET after the paſſive SIGN BE.

The third example is not correct, in conſequence of omitting BE.

The fourth example is proper. You may omit *This houſe*, and write TO BE LETT. But take care that you never prefix, *Theſe premiſes*; *Theſe premiſes to be lett*. When houſes or eſtates have been deſcribed (ſuppoſe in an advertiſement) you may ſubjoin, *The* PREMISES *may be viewed*, *The* PREMISES *are to be lett*, *The* PREMISES *are to be ſold*, &c. inſtead of ſaying, *The above houſe and gardens*,

or, The above eſtate, may be viewed, lett, or ſold, &c.

The ABOVE HOUSE *to be ſold*, may be affixed to a habitation with as much propriety as, *Theſe premiſes to be ſold.* This is a long letter.

Farewell.

Dear Charles,

THE higher we aſcend, the wider opens the horizon to our view—and though you may think I have written a great deal, you muſt not be ſurpriſed, when I tell you, there remains more to be done.

Propoſe.

I PROPOSE *to give a general view of the chief principles relating to this ſubject.* DR. BLAIR.

We PROPOSE doubts, queſtions, and projects to others.

We

We PURPOSE what we intend to do of ourſelves.

Who would ſay, *I* PURPOSE *that the thanks of this court be given to* Mr. Oſwald? or I PROPOSE to give my vote to Mr. Bowgin?

Catch.

When the whole meaning muſt be CATCHED *from the mouth of the ſpeaker, great conciſeneſs is to be avoided.* DR. BLAIR.

Perſons well educated, never uſe the word CATCH. If a man be in purſuit of another, they ſay, he will OVERTAKE him, inſtead of CATCH him. And, we have CAUGHT or TAKEN cold, inſtead of, we have CATCHED cold. You will be CAUGHT or DETECTED, inſtead of you will be CATCHED. Thief-*taker*, not thief-*catcher*.

To CATCH *the meaning from the mouth*, is a ſtyle of ſpeaking not ſufficiently dignified and refined to be admitted into *lectures* on *eloquence*. I do not deny that we have ſimilar phraſes in *England*; for our vulgar frequently exclaim—*Let us have none of your jaw; I know your* MEANING *by your* GAPING.

Persecute. Prosecute.

He was PERSECUTED *for* FORGERY.

I can aſſign no reaſon but cuſtom, for the appropriation of PROSECUTE to judicial proceedings, and PERSECUTE to extrajudicial.

Legal PROSECUTION is founded on a complaint of civil injuſtice. The *offence* is the object of purſuit, not the *offender*.

PERSECUTION is *perſonal*, and ariſes from enmity.

As no judge on the bench, no gentleman at the bar, ever talks of PERSECUTION for murder, forgery, or any offence againſt the laws, it is abſolutely neceſſary to conform to the eſtabliſhed diſtinction.

To Learn. To Teach.

The maſter *teaches*. The ſcholar *learns*.

Read, nor Write.

Literature was ſo little known from the ninth to the fourteenth century, that few men could either READ *or* WRITE. DR. TRUSTLER.

It is unneceſſary to add, that a perſon cannot WRITE, after you have informed us that he cannot READ. A perſon may be able to READ, though not to WRITE, and therefore it ſhould be thus expreſſed, He can neither *write* nor *read*.

Bred and Born.

Some author, I do not recollect his name, has condemned this arrangement with great ſeverity. It is unqueſtionably more proper to name the place of BIRTH prior to that of EDUCATION.

It can't be hoped.

HOPED, in this phraſe, is a corruption of the antient word HOLPED, HOLPEN. It is a common

exclamation after an accident, *It can't be hoped*; that is, no aid, no effort can *prevent* the loſs ſuſtained. I would recommend, it is *unavoidable*, *irretrievable*, *inevitable*, according to the exigency.

Called.

WE CALL to a perſon when we deſire to engage his attention; and we uſually CALL him by his name. Hence, in popular phraſeology, *He is called*, ſo and ſo: but I prefer *named*.

I am

Your very affectionate Friend.

I wonder.

My Dear.

A FEW years ſince, a perſon, naming himſelf Dr. Katterſelto, travelled through the country with WONDERS! WONDERS! WONDERS! and I once attended, what he termed, a Lecture on Magnetiſm, but ſaw nor heard any thing *ſurpriſing*; himſelf

himſelf excepted; who was, I believe, the moſt impudent, as well as the moſt ignorant of men. The populace are accuſtomed to uſe I WONDER on very improper occaſions: e. g.

I wonder what's a clock! I wonder whether it will rain to day! With equal propriety you may ſay,

I ADMIRE *what's a clock! I am* ASTONISHED *whether it will rain to day!*

A perſon of education enquires, *What's the hour? Will it rain to-day?*

I WONDER *the man is ſo inactive*, is a proper expreſſion, and equivalent to, *I am* SURPRISED *the man is ſo inactive.*

I WONDER *whether they will conquer the Turks*, is improper, and equivalent to, *I am ſurpriſed whether they will conquer the Turks.* On ſuch occaſions, it is more correct to ſay, *I am unable to determine: I am at a loſs to conjecture; I am in doubt; I wiſh to know, &c.*

If you can ſubſtitute *I am ſurpriſed*, or *I am aſtoniſhed*, for *I wonder*, the phraſe is Engliſh; if you cannot, it is a *barbariſm.*

Ought. Aught.

THE late Mr. Shaftoe, in 1759, *rode fifty miles in one hour and forty nine minutes; the greateſt feat of the kind, for* OUGHT *I know, ever performed.*

It ſhould be, for AUGHT I know; meaning, for *any thing* I know.

The fore-wheels of all carriages OUGHT *to be ſo high, that their axles may be even with the breaſt of the horſes.*

This expreſſion is proper, for OUGHT is a verb.

Lie. Lay.

THE neuter verb LIE is frequently confounded with the active verb to LAY; to avoid the impropriety,

priety, remember that LIE, LAY * and LAIN have no accusative case expressed; thus,

Present tense,	*I* LIE *on the sofa.*
Imperfect tense,	*I* LAY *on the sofa.*
Perfect tense,	*I have* LAIN *on the sofa.*

But LAY, the active verb, has an accusative case expressed; thus,

Present tense,	*I* LAY him *on the sofa.*
Imperfect tense,	*I* LAID him *on the sofa.*
Perfect tense,	*I have* LAID him *on the sofa.*

Here, my dear boy, is the end of my present observations; but you shall hear from me again very soon.

Adieu.

* I mean the past tense of *lie*.

Dear Charles,

I HAVE clofed my feries of critical obfervations, but am unwilling to terminate my correfpondence, without giving you a little counfel for the government of your time, and for your future welfare. In the firft place, let me advife you not to wafte your youth, your beft feafon of improvement, in trivial amufements; becaufe you will find ignorance in age not only a fevere mortification, but a real evil. Let me fee you defirous to make the moft of your abilities; and fuffer not a falfe opinion of your capacity to be a difcouragement in your endeavours after information. A common underftanding, with well-directed application, will go further than a lively genius, attended by that impatience which generally accompanies quick parts. It is not from want of ability that fome men are fuch trifling companions—fo little qualified for the friendfhip of the fenfible; it is oftener from the neglect of exercifing talents which they really poffefs, and omitting to cultivate a tafte for intellectual attainments. The means of knowledge are eafily found by thofe who feek them; and their labour

will

will be abundantly rewarded. But, my Charles, my affection for you extends it's views beyond this tranſitory exiſtence; it conſiders you a candidate for immortality; and ſees with ſolicitude the dangers that will ſurround you. Be on your guard; for you will meet with ſirens of various kinds (doubt it not) to tempt you out of your courſe. Let religion govern your actions; and ſtudy to regulate your heart by the true ſpirit of Chriſtianity. The purſuit of knowledge, guided by religion, conduces to many valuable ends; it will give you the habit of induſtry; it will qualify you for the nobler kinds of friendſhip; and conſtantly promote in you candour and liberality. While I have endeavoured to apply to your advantage what my experience could furniſh, my heart was animated by hopes which I earneſtly pray may be rewarded. With joy ſhould I ſee you ſhine a bright example of all that is excellent, and grateful would be the reflection that I had, in ſome meaſure, contributed to make you ſo.

My dear Charles, Adieu.

Definitions of Terms,

USED IN

Science.

Geometry, from γη, *gè*, the earth, and μετρον, *metron*, to measure.

Technical, from τεχνικος, *technikos*, belonging to arts.

Problem, προβλημα, *problema*, from βαλλω, *ballo*, to throw, and προ, *pro*, before; i. e. to propose, or set before: a proposition which proposes something to be done; as to bisect a line, &c.

Arch, from *arcus*, a bow, *Lat.* and, when used in geometry, implies any part of a circumference of a circle.

Indefinitely, without bounds.

Radius, a right line drawn from the center of a circle to it's circumference. This right line, I conceive, anſwers to the rays of light, (in an optical ſenſe) which, falling upon the eye every where in right-lined directions, form a horizon to our ſight.

The term **Scale** ſeems to have been derived from the *Steel-yard* and it's diviſions marked on the beam, to adjuſt the different degrees of weight by.

Angle, from Αγκυλος, *ankulos*, the bending of the elbow; and in geometry, implies the point in which two lines meet.—But the quantity of an angle is the ſpace comprehended between the two lines meeting in a point, and it's proportion is expreſſed by degrees; which term **Degree** means ſimply the three hundred and ſixtieth part of a circle, whether great or ſmall.

Vertical, placed in a direction perpendicular to the horizon.

Sector, ſo called, becauſe when opened, it comprehends a portion of a circle between two ſemidiameters, making an angle at the center.

Polygon, from πολυς, *polus*, many, and γωνια, *gonia*, a corner; having many corners or angles.

A line is ſaid to be **Bisected**, when it is divided into two equal parts; from *bis*, twice, and *ſectum*, cut in two.

Tangent, from *tangens*, Lat. touching.

Superficies, *ſuperficies*, Lat. the ſurface of any thing; an extenſion which has length and breadth, but no thickneſs.

Obtuse, ſignifies blunt, and

Acute, ſharp.

Convex, the outer curve of an arch.

Concave, the inner curve of an arch.

Spherical, ſomething like a globe.

Pentagon, from πενΊε, *pente*, five, and γονια, *gonia*; a five-cornered figure. The other *Polygons* have all their

their particular names formed in the ſame way, from the Greek numeral adjectives.

Hexagon,	because it has	6	angles.
Heptagon,		7	
Octagon,		8	
Nonagon,		9	
Decagon,		10	
Undecagon,		11	
Duodecagon,		12	

Segment, from *Segmentum*, a piece cut off.

Ellipsis, from ελλειψις, *elleipſis*, a defect or omiſſion. If a ſuperfice be apparently round, but on meaſuring it, if one of it's diameters be found ſhorter than the other, there is then a defect, and we ſay that the figure is elliptic.

Periphery, from περι, *peri*, about, and φερω, *phero*, I bear or carry; which alludes to the hand bearing the radius about it's center, in order to deſcribe the circumference of the circle.

Cube, from κυβος, *kubos*, a die; ſometimes called an

Hexaedron, becauſe it has ſix baſes, on which it can be reſted; εξ, *hex*, and εδρα, a ſeat.

Prism, from πρισμα, ſomething cut off.

Tetrahedron, from τετρα, *tetra*, four, and εδρα, as before. It may be conſidered as a triangular pyramid of four equal faces.

Pyramid; the learned are divided in their opinions about the derivation of the term *pyramid:* ſome think the name is from πυρ, *pur*, fire, becauſe pyramids aſcend to a point like fire; but others more confidently affirm, that it is from πυρος, *puros*, wheat, or corn. Not, ſays the author of the laſt opinion, that we are to ſuppoſe that the pyramids were ever intended for granaries; but that when the Greeks viſited Egypt, and ſaw thoſe amazing ſtructures, they looked on them as ſtore-houſes for grain; and knowing Egypt to be a country fruitful in corn, they called them *Pyramids*—corn ſtore-buildings; being, as they thought, the repoſitories for all the produce of Egypt.

Cylinder; this figure is repreſented by a garden roller, whence it's name κυλενδρος, *kulendros*, a roller.

Hemiſphere, from σφαιρα, *ſphaira*, a globe or ſphere, and ημισυς, *hemiſus*, half, i. e. half a globe.

Section, a cutting, from *ſeco*, to cut.

Architecture implies the ſcience of building in general, which gives rules for deſigning and raiſing all kinds of ſtructures. It is from the word architect, compounded of αρχος, *archos*, the principal, and τεκτων, tecton, chief artificer; or one who gives rules for, and directs the management of buildings.

Plinth, from πλινθος, *plinthos*, a brick, or flat ſquare ſtone, on which columns, in their moſt antique ſtate, are ſuppoſed to have ſtood.

Dado or **Die**: ſo called, becauſe it is of a cubical form.

Cornice, from the Latin *coronis*, a crowning; becauſe the cornice is the crowning of the pedeſtal.

Base, from βασις, a foundation for the column.

Shaft, is that long and ſtraight part of a column, comprehended between the baſe and capital.

Some derive it from σκαπτω, *ſkapto*, to dig in the manner of a well, round and deep, whoſe inſide reſembles the ſhape of a pillar; and ſome, from the long part of an arrow or ſhaft. The ſhaft of a mine

is

is the round, perpendicular paſſage they make to come at the ore.

Capital, from κεφαλη, *kephale*; or *caput*, the head, which the capital is to the column.

Architrave, is ſo called, becauſe it is the chief ſupport to the whole entablature, from αρχος, *archos*, chief; and the Latin *trabs*, a beam.

Freeze, from φιβρον, *phibron*, a border or fringe; what the ancients uſed to call ζωφορος, *zophoros*, becauſe it was uſually enriched with the figures of animals.

Fillet, from the French word *fil*, thread.

Cymatium, or **cyma-recta**, from κυματιον, *kumation*, a wave; becauſe this member reſembles the ſwelling and concavity of a wave.

Ovolo, or Latin, *ovum*, which means an egg; becauſe this member, in the Ionic, Compoſite, and Corinthian orders, is generally carved in the ſhape of eggs and darts.

Cavetto, from the Latin *cavus*, hollow.

Abacus, from αβαξ, *abax*, a ſhelf or table; or, as ſome ſuppoſe, a tile on which the ancient Greek mathe-

mathematicians ſtrewed duſt to draw their geometrical ſchemes on.

Astragal, from αςραγαλος, *aſtragalos*, a bone of the heel; or the curvature of the heel, which this member reſembles.

Apophyge, from αποφυγη, *apophuge*, eſcape; becauſe that part of the column appears to fly off.

Torus, from τορος, *toros*, a cable, which this member reſembles.

Triglyphs, from τριγλυφος, *trigluphos*, three engravings. It is compounded of τρι, *tri*, three, and γλυφω, *glupho*, to carve or engrave; in conformity to which derivation, the *triglyph* has two entire channels, and two half ones, with three ſpaces between.

Volute, from the Latin *volvendo*, to roll round, as on a ſtaff.

The term *volume* has the ſame origin, becauſe anciently they formed books with ſheets of written parchment or bark, rolled round a ſtick.

Dentils, from *dentelli*, teeth, which they reſemble; and the flat member on which theſe dentils are placed, is termed *denticulus*.

Pupil, in general, means a youth, under the tuition of a maſter; but why it has been introduced into optics, and applied to the ſmall opening of the eye which receives the light, is owing to the little image, or *pupilla*, a puppet, which is reflected in the eye, and ſeen by every one who looks ſteadily on it, being no other than the ſpectator himſelf, whoſe image in miniature is reflected on the cryſtalline humour.

Retina, from *rete*, a net; becauſe this part of the eye is a fine expanded membrane, ſomewhat open like a net, and ſpread over the bottom of the eye, on which are painted the pictures of all the objects we perceive.

Horizon, from ορίζω, *horizo*, I limit or bound; viz. the ſight.

Subtend, from *ſub* and *tendo*, I ſtretch.

Radial, from ραβδος, *rabdos*, or radius, a ray of light.

Elements, from the Latin *elementum*, the firſt rudiments of any ſcience.

Catoptrics, from κατοπτρον, *katoptron*, a mirror or looking-glaſs. Catoptrics teaches the ſcience of reflex viſion, and optics that of direct viſion, though in the general and extenſive meaning of the term

OPTICS,

OPTICS, from οπτομαι, *optomai*, *I see*, it includes in it whatever relates to ſight, or the doctrine of viſion; and therefore muſt imply DIOPTRICS alſo, which teaches the properties of refracted viſion; that is, when rays of light paſs through one medium into another, as through air into water.

Tripod, of τρεις, *treis*, three; and ποδιον, a foot. Anciently the word tripod uſed to be applied to a kind of ſacred three-footed ſtool, on which the heathen prieſts were ſeated to receive and deliver their oracles; from which we may learn how time alters words; any fire-ſcreen or three-legged ſtool, is now called a *tripod*.

Iconology, from εικον, *eikon*, an image, and λεγω, *lego*, I ſpeak. The interpretation of ancient images, monuments, and emblems.

Democracy, from δημος, *demos*, people; and κρατειν, *kratein*, to govern; is when the ſovereign power is lodged in the body of the people.

Ariſtocracy, from αριστος, *ariſtos*, the beſt, and κρατιω, *kratio*, I command; is when the ſupreme power is lodged in a ſenate, compoſed of the principal perſons of a ſtate, either for their nobility, capacity or probity.

Monarchy, from μονος, *monos*, alone; and αρχη, *arche*, government; is when the ſupreme power is inveſted in one perſon, commonly termed the King.

An Outline of Geography.

A man, by the help of Charts, Books, Maps and Masters, may become an excellent geographer, without stirring out of his elbow chair.

DR. HENRY.

GEOGRAPHICAL TERMS Explained.

LAND.

A Continent is a large tract of land, not separated by an ocean: as EUROPE.

An Island is land surrounded by water: as *Great Britain.*

A Cape is land running into the sea: as *the Cape of Good Hope.*

A Peninsula is land, almost surrounded by water: as *the Morea.*

An Isthmus is a neck of land which joins a Peninsula to a Continent: as *the Isthmus of Suez.*

A Coast is the edge of land which is next the sea.

WATER.

An Ocean is a large extent of waters not separated by land: as *the Atlantic.*

A Lake is water surrounded by land: as *the Lake of Geneva.*

A Bay is the sea running into the land: as *the Bay of Biscay.*

A Gulph is the sea almost surrounded by land: as *the Gulf of Venice.*

A Strait is a narrow passage, having land on each of it's sides: as, *the Straits of Gibraltar.*

A Road is a place of good anchorage for ships.

GEOGRAPHY

IS a deſcription of the earth.

General Map of the World.

IN this map, the top is the north; the bottom, the ſouth; the part on your right hand, the eaſt; and the part on your left hand, the weſt.

Poles. That part of the *top* marked 90, is called the *North Pole*; and that part of the *bottom* marked 90, is called the *South Pole*.

Circle. When any circle is ſpoken of in a mathematical ſenſe, it is ſuppoſed to be divided into 360 equal parts, called degrees; and every degree is alſo ſuppoſed to be divided into 60 equal parts, called ſeconds.

Hemispheres. The earth is a globe; or, as ſome call it, a ſphere; conſequently, half of the earth is half a ſphere; to ſpeak more ſcientifically, half of the earth is a *Hemiſphere.* Now, theſe two large circles repreſent the two hemiſpheres of the globe, ſuppoſing it cut into two equal parts.

Horizon. The broad yellow circles which ſurround theſe two hemiſpheres, repreſent the *Horizon*; that is, an imaginary circular line, which would divide the viſible from the inviſible half of the earth, ſuppoſing you were raiſed ſo far above the earth, as to ſee one-half of it.

Equator. That ſtraight line which paſſes through the middle of each hemiſphere, is called the *Equator*—becauſe it equates them; that is, becauſe it divides them into equal parts.

Tropics. The thick, black circle which paſſes over New Holland, and that which you ſee at the ſame diſtance from the equator, on the north ſide, are called the *Tropics.*

Polar Circles. The other thick circles near the north and ſouth poles, are called the *Polar Circles.*

Zones. The tropics and polar circles limit the *Zones*: thus,

The ſpace between the tropics, is the *Torrid Zone.*

The ſpaces between the tropics and polar circles are the *Temperate Zones.*

The ſpaces within the polar circles are the *Frigid Zones.*

Torrid means burning,
Temperate means moderate, and
Frigid means frozen.

Meridians. Theſe circles which you ſee meet in both poles, are called *Meridians:* they paſs through every fifteenth degree of the equator, marking the longitude.

Longitude. By this, I mean, the diſtance eaſt or weſt from any particular meridian, counted on the equator, and never exceeding 180°. In Engliſh

maps, the firſt meridian is generally placed at Greenwich, but the map before you, begins it's firſt meridian at the iſland of Ferro.

Latitude. Every circle (as has been ſaid) contains 360 degrees; conſequently, every half-circle contains 180 degrees, and every quarter-circle, 90 degrees: therefore, from the equator to the north pole, being a quarter-circle, there are 90 degrees; and likewiſe from the equator to the ſouth pole, being a quarter-circle, there are 90 degrees. Now by *Latitude* is meant the diſtance from the equator, either north or ſouth, never exceeding 90 degrees; and the curve lines which are drawn from every 10th degree on the horizon, are called *Parallels of Latitude.*

The four Quarters. The firſt great diviſions of the earth are called the four quarters of the world: namely,

Europe, Asia, Africa and America.

The northern hemiſphere is occupied by Europe, Aſia, the greateſt part of Africa, and North-America.

In

In the Southern-Hemiſphere, we find no land except South-America, part of Africa, New-Holland, and iſlands in the Pacific Ocean.

When our ſhips go to the Eaſt Indies, or come from thence, they water at St. Helena, and touch at the Cape of Good Hope: now look on the map, and you will find that St. Helena is about 11° E. long. and 15. 55 S. lat. and the Cape of Good Hope will be diſcovered at the ſouthern extremity of Africa.

Other remarkable places are New-Holland and Nootka Sound. On the S. E. coaſt of New-Holland you will ſee Botany-Bay: and on the Weſt coaſt of North America, in lat. 50° you will lay your finger on Nootka Sound; lately the bone of contention between us and Spain.

Atlantic. Before you quit this map, take notice that the ſea between Europe and North America is called the Atlantic.

Pacific Ocean. That collection of waters between America and the eaſt coaſt of Aſia, is called the *Pacific Ocean.*

Great South Sea. That ſea, which occupies the greateſt part of the ſouthern hemiſphere, is called the *Great South Sea.*

EUROPE.

THIS map before you is the Europe we have already ſeen, but it is drawn on a larger ſcale. Here, the degrees of latitude on the ſides, and the degrees of longitude at the top and bottom are much larger. By theſe means, Europe becomes as large as the whole world; and as theſe degrees may be extended to any ſize, a kingdom may be magnified to appear as large as Europe: or a province as large as a kingdom.

Bounded. Europe is bounded
On the E. by Aſia.
On the W. by the Atlantic.
On the N. by the Frozen Sea; and
On the S. by the Mediterranean.

Mediterranean. The Mediterranean is a principal object in this map; and deſerves your conſideration: for

It waſhes the coaſts of
Spain,
France,
Italy, and
European Turkey.

It contains the iſlands of
Ivica,
Majorca,
Minorca,
Corſica,
Sardinia,
Sicily,
Candia, and
Cyprus; beſides the ſmall iſlands of the Archipelago; and others in the Gulph of Venice.

Scale. If you apply your compaſſes to that ſcale of Engliſh miles, and then ſtride them from one end to the other of the Mediterranean ſea, you will find it about 2000 miles in length.

With your compaſſes thus extended you can meaſure the kingdoms in this map; or the diſtance between any two places.

Size of Kingdoms. The map being coloured, you immediately perceive the ſize and ſituation of the ſeveral kingdoms. You obſerve the wonderful extent of the Ruſſian Empire; and the remainder of that empire you will find covers an equal proportion of Aſia.

Sweden, though not very powerful, is next in ſize: and the following differ not materially in dimenſions: namely,

France,
Spain,
Germany,
Poland*,
Denmark and Norway,
Turkey,
Great Britain and Ireland,
Italy and it's appendages,

The ſmaller ſtates and kingdoms are,

Holland †, Switzerland.	States.
Portugal, and Pruſſia.	Kingdoms.

But you are not to eſtimate the territories of his Pruſſian Majeſty by the ſize of his *kingdom*. Be-

* Poland has lately been diſmembered, and divided between the Empreſs of Ruſſia, the Emperor of Germany, and the King of Pruſſia.

† Holland, at preſent, bows to France.

ſides

ſides that, he is Elector of Bradenburgh, in Germany, where you will find Berlin his capital. To theſe the laſt King of Pruſſia added part of Sileſia in Germany, in 1742.

Sometimes in converſation you may wiſh to recollect the latitude of the principal cities in Europe: the beſt method of fixing this in your memory, is to trace with your finger thoſe cities that lie in, or near the ſame parallel; thus,

Beginning with lat. 41°, on the W. ſide of the map, (and paſſing a little above the line 40) you will firſt touch upon Oporto in Portugal; thence travelling eaſtward, you will paſs through Madrid, the capital of Spain; thence, over the iſland of Sardinia to Naples in Italy; and thence to Conſtantinople.

Theſe cities therefore lie in, or very near, the ſame degree of latitude.

If you move your finger up to 48, and proceed eaſtward, as before, you will paſs through

Paris,
Manheim,
Ratiſbon,
Near Vienna,
Preſburg,
Through the N. of Hungary and
The S. of Ruſſia.

About the latitude 52, you will find

London,
Amſterdam,
Brunſwick,
Berlin, and
Warſaw.

In 56 (paſſing from W. to E. on the ſame parallel) you will travel through

Edinburgh,
Copenhagen, and
Moſcow.

Peterſburgh, the capital of the Ruſſian Empire, lies in 60°, the latitude of the Shetland iſlands.

Inland Seas. Beſides the Mediterranean, there are two other inland ſeas.

The Baltic, and
The Black Sea.

The Baltic Sea communicates with the German Ocean, through the Categate.

On

On the coaſt of the Baltic, there are ſeveral towns which deſerve particular notice; as you find them frequently mentioned in the public papers.

The Black Sea communicates with the Mediterranean, by the Archipelago.

The ports of the Black Sea merit attention, on account of the late war between the Ruſſians and Turks.

Rivers. The Volga riſes in Moſcovy and falls into the Caſpian Sea, at Aſtrachan.

The Don's ſource is not far from that of the Volga, but it runs into the ſea of Aſoph.

The Danube and the Rhine take their riſe in, or very near Switzerland.

The Danube takes an eaſtern courſe, and after paſſing through Germany, Hungary and Turkey, falls into the Black Sea.

The Rhine takes a contrary direction; runs through Germany and Holland, and empties itſelf into the German Ocean.

Rivers of leſs note are

The Elbe at Hamburg,
The Tagus at Liſbon,
The Thames at London, and
The Rhone in France; which laſt falls into the gulf of Lyons, near Marſeilles.

Great Britain. As to our iſland, you ſee it lies between 50 and 60 degrees of N. latitude: and that on the E. it is ſeparated from the Continent, by the German Ocean—on the W. from Ireland, by St. George's Channel—and on the S. from France, by the Engliſh Channel.

A S I A.

In *Aſia*, as in Europe, the Ruſſian dominions cover the largeſt ſpace.

Kamschatka and Siberia .In this vaſt territory, there are few objects worth remembering, except *Kamſchatka*, (which is mentioned by ſome of our northern

ern navigators) and that inhoſpitable region, called Siberia, to which Ruſſian malefactors are baniſhed.

Kamſchatka lies in between 55 and 60°; the latitude of Scotland.

Tartary, Arabia and Perſia. With Tartary we have no concern: with Arabia and Perſia almoſt as little.

Turkey. In Turkey (at the eaſt end of the Mediterranean) you find Smyrna and Aleppo. Theſe places are well known to our merchants trading to Turkey. You alſo find Jeruſalem there; and other towns mentioned in ſcripture.

India. We will now proceed to India, and trace the coaſt from Surat (on the W. ſide) to the mouths of the Ganges; at the eaſtern extremity we ſhall paſs Bombay, Goa, and thence along the coaſts of the Carnatic, Malabar, and Coromandel, till we come to Pondicherry, Madras, and ſo on to Calcutta.

Paſſing to the ſouth of the equator, we ſail between the iſlands of Sumatra and Java. Leaving the Dutch ſettlement of Batavia on the right, we

proceed directly N. to Canton, in China, and thence to Pekin, at the northern extremity of the Chinese Empire.

That part of India with which we have any connection, lies within the torrid zone, and consequently is excessively hot.

Islands. The several clusters of islands in this map are those of

Japan,
Sonda,
The Philippines,
The Ladrons,
The Moluccas or Spice-Islands, and
The Maldivias.

AFRICA.

AFRICA forms a very considerable part of the habitable globe. Hitherto Africa has been so imperfectly explored, that in any part of it our knowledge extends but to a small distance from the coasts.

Bounded. Africa is bounded,
On the E. by the Indian Ocean;
On the W. by the Atlantic;
On the N. by the Mediterranean; and
On the N. E. by the Red Sea.

Extends. Africa extends about 5000 miles: viz.
From 37° N. latitude,
To 35° S. latitude: the equator running nearly through the middle of it.

Coast of Barbary, &c. If you begin at the Straits of Gibraltar, at the N. W. corner of the map) and follow the S. coaſt of the Mediterranean, you come to

Algier, then to
Tunis, and then to
Tripoli; which are the only places of conſequence on the coaſt of Barbary.

Continuing your journey eaſtward, you arrive at

Alexandria, in Egypt.

And paſſing the mouths of the Nile, you come to

Grand Cairo.

Thence travelling with the celebrated Bruce, between the Nile and the Red Sea, you traverſe

The Kingdom of Nubia;

and arrive in

Abiſſinia.

From thence (ſtill following the coaſt) you will not find a name that you have ever heard before (or that deſerves to be remembered), till you come to

The Cape of Good Hope.

This is a Dutch ſettlement in the country of the Hottentots; a people with whom we begin to be better acquainted, ſince the publication of ſome late travels into this part of the world.

Having doubled the Cape, you proceed northward, till you come to

The Coaſt of Guinea.

Thence you paſs the rivers Gambia and Senegal, on the Negro-coaſt, leaving (a little to the W.)

Cape de Verd iſlands; then
The Canaries; and laſtly,
The Iſland of Madeira.

St. Helena and Ascension. On the S. of the Equator, at a conſiderable diſtance from the continent, you ſee two ſmall iſlands:

St. Helena, and
Aſcenſion; both in the track of our Eaſt-India ſhips.

Madagascar. There is alſo an iſland on the E. coaſt of Africa, called Madagaſcar, which is too large to have eſcaped your notice.

AMERICA.

THIS map of the continent of America, and of the Weſt-India iſlands, requires to be ſtudied with attention; particularly N. America: as without a competent knowledge of that country, you cannot poſſibly underſtand the hiſtory of your own times.

N. America. N. America lies between the northern extremity of *Hudſon's Bay*, and the *Gulf* of *Mexico*.

New South Wales. Between the latitude 55 and 50 you will find New S. Wales and Labrador; these are very cold, though in the same latitude as England.

Canada. From 50 to 45 you have Canada, Nova Scotia and Newfoundland: these are likewise extremely cold, though in the latitude of France.

New England. Between 45 and 40 lies New England.

Thence you proceed southward through

Jersey,
Pensylvania,
Maryland,
Virginia,
N. and S. Carolina,
Georgia, and
Florida.

Westward of these you observe
Louisiana, and
The vast kingdom of Mexico, extending southward as far as Panama, within 7 degrees of the equator.

S. America. From Panama, down to Cape Horn, you pafs no places of note, except Lima, the capital of Peru; whence the Spaniards import gold, and (what is more intrinfically valuable) the *Cortex Peruvianus.*

Juan Fernandes. In latitude 33 you leave, a little to the W. the ifland of Juan Fernandes, rendered famous by Anfon's voyage.

Paraguay. You now double the Cape, and paffing Falkland's Ifland, proceed northward along a defart coaft till you come to Buenofe Ayres, at the mouth of the great river Paraguay, which runs through an extenfive country named Paraguay.

Brasils. You are now arrived at the Brafils, a large country; the coaft of which is in poffeffion of the Portugueze.

Surinam. Having doubled *Cape St. Rouge*, and paffed the vaft river of the Amazons, you touch at the Dutch fettlement of Surinam, and thence pro-

ceed by the coaſt till you come to Curacao; an iſland alſo in poſſeſſion of the Dutch.

I. of Curacao. From this iſland the Dutch import that ſuperior ſpecies of Tobacco, which they call Kanaſter or Varinas; the laſt is the name of a town on the Spaniſh Terra-firma, in the neighbourhood of which this tobacco is cultivated by the inhabitants, who barter with the Hollanders for European goods.

Carthagena and Portobello. From Curacao we continue our coaſting voyage till we arrive at Carthagena and Portobello: names that were once familiar to every individual in Britain.

Portobello was taken by Admiral Vernon, 22d Nov. 1739, who became the hero of the day, and the ſign of an alehouſe in every village.

Bays of Honduras and Campeachy. You now come to the Bays of Honduras and Campeachy. In the Bay of Honduras we claim a right to cut logwood; which right the Spaniards diſpute, whenever they want a pretence for quarrelling.

River Missisippi. Passing Vera Cruz, you leave the city of *Mexico* on the left, and continue coasting the Gulf of Mexico, till you come to New Orleans, near the mouth of the famous river Missisippi: the project of a trade to which, somewhat more than 50 years ago, ruined half the people in France.

VII. India Islands. Your next objects are the islands of

Cuba,
St. Domingo, sometimes called
Hispaniola.

These two belong to Spain.

Havannah. Near the western extremity of Cuba, you find the Havannah, which the late Lord Albemarle and Sir George Pocock took 13th Aug. 1762, in the war preceding the last.

Jamaica. South of Cuba lies our Jamaica; and to the northward, the Bahama islands.

East

Eaſt of St. Domingo, you fall in with another ſtring of ſmall iſlands; the chief of which are belonging to the Engliſh:

Antigua,
St. Kitts,
Barbadoes, and
Nevis.

Belonging to the French,
Martinico,
Guadalope,
St. Lucia, and
Dominica.

Society Islands. For the knowledge of the Society Iſlands, in the Pacific Ocean, we are principally indebted to the late Captain Cooke: they lie in between 15 and 20 degrees of S. latitude. In the center of theſe you obſerve the celebrated Otaheitee.

To thee, O Cooke, familiar grew the taſk
Of circling all our globe: Ocean rever'd
Thy hardy enterprize; reveal'd to thee
New awful ſecrets of his mighty world.
Philoſophy
Records with pride thy life-preſerving arts:
And oft by the ill-fated ſtrand, where thou,
O'erpower'd by barbarous multitudes, art fallen,
The paſſing ſhip ſhall veil her gallant pomp,
In homage to thy memory.

Astronomical Dialogues.

Say, ſhould the philoſophic mind diſdain
That good, which makes each humbler boſom vain?
Let ſchool-taught pride diſſemble all it can,
Theſe LITTLE THINGS are great to LITTLE MAN.

Goldsmith.

PRECEPTOR. Aſtronomy, my boy, is the moſt ſublime of all ſciences, and the beſt for enlarging our minds, and filling them with the nobleſt ideas of the Great Creator and his works.

SCHOLAR. I have often heard, Sir, that the ſun does not move; to what then is he fixed? and what hinders him from falling down to the earth, when he is ſo high above it; eſpecially at noon in ſummer?

P. *High* and *low*, my dear, are only *relative terms*; for when the ſun is at his loweſt depreſſion with reſpect to us, he is directly overhead to ſome other part of the earth; for the earth is round like a *globe*; and on whatever part of it's ſurface an untaught

taught perſon ſtands upright, he thinks himſelf on the uppermoſt ſide, and wonders how any one can ſtand directly oppoſite to him, on the undermoſt ſide of the earth; or rather, how he can hang to it, with his head downward, and not fall off to the lower ſky.

S. That is what I have often wondered at, when I have heard it affirmed that the earth is habitable on all ſides; and that, where towns cannot be built, ſhips may ſail. How comes it to paſs, that the weight of a ſhip cauſeth it not to fall off from the lower ſeas; or that theſe ſhips and ſeas do not fall off to the lower ſky altogether?

P. What we call *weight* is cauſed by *attraction*. The earth attracts all bodies on or near it's ſurface, towards it's centre, equally on all ſides, every particle of matter alike; and therefore thoſe bodies which contain the greateſt number of particles of matter, acquire from this attraction the moſt forcible preſſure, and conſequently have (what we call) the greateſt *weight*. The earth may be compared to a large round loadſtone, rolled in filings of iron, which attracts equally on all ſides; ſo that they cannot fall off even from it's undermoſt ſide: nay, it will take them up from a table, if they are within the ſphere of it's attraction.

S. So

S. So far, Sir, I underſtand you very well; but ſtill it ſeems odd to me, that people ſhould ſtand oppoſite to us on the earth, with their heads downward.

P. I believe it does; but you know, that either the ſun muſt go round the earth to give us days and nights, or the earth muſt turn round like a globe on it's axis to do ſo; and will not either of theſe motions anſwer the intended purpoſe?

S. Undoubtedly.

P. Very well: then remember, that the ſun does *not* move round the earth every twenty-four hours, but that the earth turns round in twenty-four hours: and, as the ſun can enlighthen only one half of the earth at any given inſtant of time, the other half muſt then be in the dark. This motion of the earth will cauſe the different places on it's ſurface to revolve through the light and dark in twenty-four hours; in which time they muſt have a day and a night: and at the inſtant, when it is mid-day at one place, it muſt be mid-night at the oppoſite.

S. Pray, Sir, how do you *prove* that the earth turns round?

P. Stand

P. Stand up for a minute. It is now ſeven o'clock in the morning, and you think you are ſtanding upright, on the uppermoſt ſide of the earth. You will think the ſame, if you ſtand upright at ſeven o'clock in the evening, when the earth is turned half round, becauſe you will then perceive no difference of poſture: and yet, at that time, you will be very nearly in the ſame poſition as a perſon is juſt now, who ſtands on the ſide of the earth oppoſite to us: which perſon being as ſtrongly attracted by the earth there, toward it's centre, as we are here, he is in no more danger of falling off downward, than we are at preſent of falling upward.

S. I beg your pardon, Sir; but pray is not *falling upward* an improper expreſſion?

P. Yes; nor do I remember ever to have uſed it before. But, *up* and *down* are only *relative terms*. Let us be on what part of the earth we will, we call it *up* toward the ſky over our heads; and *down* toward the center of the earth, to which all terreſtrial bodies would fall by the power of the earth's attraction. So that, with regard to open ſpace, what is *up* from any given point of the earth's ſurface, is *down* from the oppoſite point thereof. And as the ſky ſurrounds the whole earth, we call it *up* toward the ſky over our heads, be where we will;

will; and *down* from our place toward the centre of the earth.

S. Thank you, Sir; now it is very clear to me that we cannot perceive any difference, as to our poſition at different times of the day; but how can the earth move, and we not feel it's motion?

P. Were you ever in a ſhip at ſea, in a calm day?

S. Many times.

P. And looked out of the cabin windows?

S. Very often.

P. And what did you ſee?

S. Several ſhips about us, and a diſtant town.

P. Did you ſee the ſame objects all the while?

S. The firſt object I ſaw, was a large houſe; but it ſeemed to me as if it moved very ſlowly toward the right-hand. I ſoon loſt ſight of it, and other objects appeared to my view, and diſappeared ſlowly and gradually; which could ariſe from no other cauſe, than the very ſlow and gentle turning of the ſhip the contrary way.

P. True;

P. True; but did you feel the motion of the ſhip?

S. Not in the leaſt.

P. And is not *that ſingle caſe* ſufficient to convince you, that the earth may turn round, and carry us all about with it, and we feel nothing of it's motion; eſpecially as the motion of the earth is much more regular and uniform than the motion of a ſhip.

S. But if the earth turns round, the parts of it's ſurface muſt move very faſt, to turn round once every twenty-four hours: and it's motion muſt be eaſtward; becauſe the ſun, moon, and ſtars appear to move from Eaſt to Weſt. But, pray Sir, how do you *prove* that the earth is *round like a globe*.

P. Thus: The ſun ſhines through the window. Look at *this* ſmall globe in my hand, and the flat circular plate that lies on the table. You ſee the globe may be hung by the thread which is faſtened to it. I now twiſt the thread, and by it hang the globe in the beams of the ſun; and the globe caſts a ſhadow on *that* upright board behind it. You ſee the globe turns by the untwiſting of the thread; but let it turn how it will, it always caſts as round a ſhadow on the board as if it did not turn at all. I now

now fix a thread to the edge of the flat circular plate, and hang the plate by the thread a little twiſted. You ſee, that when the broad ſide of the plate faces the ſun, it caſts a round ſhadow on the board, as the globe did: but as it turns obliquely toward the ſun, by the untwiſting of the thread, it's ſhadow is of an oval figure on the board; and when it's edge is turned toward the ſun, it's ſhadow on the board is only a narrow ſtraight line.

S. All this is plain, Sir; but I cannot imagine what you are to infer from it.

P. The earth always caſts a ſhadow toward that part of the heaven, which is oppoſite to the ſun; and the moon appears as flat to us as the board on which the ſhadow of the ſmall globe was projected. When the earth's ſhadow falls upon the moon, we ſay, the *moon is eclipſed.* Theſe eclipſes happen at all different times of the twenty-four hours; and conſequently, when all the different ſides of the earth are ſucceſſively turned toward the ſun. But the earth's ſhadow on the moon is always bounded by a circular line; and therefore it is plain, that the earth muſt be of a globular ſhape. For, if it were ſhaped like *this* flat circular plate, it's ſhadow on the moon could never be circular but when it's broad ſide was turned directly towards the ſun. At other times, the ſhadow would be either of an

oval figure, or only a ſtraight line, as you have ſeen on the board. There are ſeveral other ways of proving that the earth is round; but I believe you are ſatisfied that it is ſo, from what I have now ſhown you.

S. Yes, Sir, I am entirely ſatisfied; but I ſhould be glad to know how you *prove* that the earth turns round; and that the ſun does not go round the earth?

P. Before I proceed to the demonſtration, let me aſk you a queſtion.

S. Twenty, if you pleaſe, Sir.

P. Suppoſe you put a ſmall bird on a ſpit, and put it to the fire; whether is the better way, to turn the ſpit round with the bird, or to let the ſpit ſtand ſtill, and move the fire round about it?

S. Your queſtion makes me laugh, Sir. Who could be ſo abſurd, as to ſet about contriving how to make the large fire and grate be carrried round the ſpit?

P. Now I can aſſure you, that the ſun is at leaſt a million of times as big as our earth, and is therefore more unfit to be moved round the earth, than

than a great fire and the grate that holds it, are to be moved round a ſmall bird on a ſpit.

S. Were I ſure, that the ſun could be proved to be a million of times as big as the earth, I ſhould aſk no other demonſtration of the ſtability of the ſun and the motion of the earth; becauſe I ſhould naturally conclude, that the ſun is a million of times more unfit to move than the earth is. And, as the moſt ſuperlative degree of wiſdom and reaſon is in the Deity, 'tis impoſſible for me to imagine, he could do any thing that is irrational.

P. Very well, indeed. Now I will *prove* to you, that the earth turns round every twenty-four hours; not upon any real axis, but on an imaginary ſtraight line within itſelf, paſſing through it's centre, and terminating in it's north and ſouth points, which are called it's *north* and *ſouth poles*; as an orange would turn round in the open air, if you firſt ſet it a-whirling, and then throw it off your hand.

Water naturally runs downward, all around the earth, from theſe parts which are higheſt, or furtheſt from the centre, toward thoſe which are loweſt or neareſt to it; and this is cauſed by the power of the earth's central attraction, which draws the water and all other bodies that way. Now, if the earth was ſmooth, like a poliſhed globe, all the parts of

it's ſurface would be equi-diſtant from it's centre, and water could never run upon it. About three-fourths of the earth's ſurface is covered by the ſeas which communicate with each other. And if the earth had no motion round it's axis, the attractive force (which is equal all around at equal diſtances from the centre) would cauſe the ſurface of the ſeas to be of a perfectly globular form.

S. Undoubtedly it would, Sir; for then, as every particle of the water's ſurface would be drawn with equal force toward the earth's centre, and theſe particles would touch each other, none of them could get nearer the centre than their neighbouring ones.

P. Right. Now, ſuppoſing the earth to be at reſt, and the ſurface of the oceans and ſeas to be perfectly globular, what do you think the conſequence would be, if the earth ſhould begin, and continue to turn round on a line within itſelf, as if it turned on a real axis?

S. Let me think a little. I have obſerved, that when our maid took her mop out of a pail of water, the head of the mop was round: but when ſhe began to trundle it on her arm, it immediately became flattened at the parts of the ſtick which were even with it's ſurface; and it ſwelled out in the middle.

Pray

Pray, Sir, if I may be allowed to make a very odd ſort of a compariſon, may not an imaginary line in the heart of that part of the ſtick which is within the mop, be called the axis round which the mop turns; as you have told me that ſuch a line within the earth, from it's north to it's ſouth poles, is called the axis of the earth? If ſo, ſeeing that the waters on the earth are of as yielding a nature as the cotton of the mop, I apprehend, that if the earth turned round it's axis, the ſurface of the ſeas about the poles would become flat, and the ſurface of the ſeas which are furtheſt from the poles would ſwell out all around: and, ſo the figure of the earth would be like that of a whirling mop.

P. No philoſopher could have made amore apt compariſon; or have drawn a better concluſion from it. When I told you before, that the earth is round, I did not mean that it is ſtrictly ſo; although, at the diſtance of the moon, it would appear to be round, as it's ſhadow on the moon does to us. I do not here conſider the hills as any thing, becauſe they are ſo little in compariſon to the whole bulk of the earth, that they take off no more from it's roundneſs in general, than grains of duſt do from the roundneſs of *that* ſmall three-inch globe which you ſee on the table. It is quite round, and covered all over with a map of the land and water on the earth's ſurface. Now, if the thin papers were

ſcraped off from the poles, and almoſt half way round them toward the equator, the globe would be a little flattened at the poles, and comparatively ſo much ſwelled out about the equator; but if it were then viewed from the diſtance of ſix or ſeven feet, it would ſtill appear to be round.

S. I believe it would, Sir; but pray, what does all this mean?

P. From actual meaſurement and obſervation, the earth is proved to be a little flattened at the poles, and ſwelled out about the equator; the equatorial diameter of the earth being thirty five miles longer than the axis or polar diameter. This you may think a great deal, but it is very little when compared with the bulk of the earth which is 25000 Engliſh miles round. Now, as water naturally runs downward, if the earth had no motion on it's axis to keep up it's figure, the water of the ſeas would run from the higher parts about the equator, to the lower parts about the poles, and overflow the polar regions for many hundred miles all around; and even Britain itſelf would be laid ſeveral miles under water.

S. This is very plain, Sir: and the not returning of the waters from the ſeas about the equator, is to me an evident proof of the earth's turning round

on

on it's axis; without which, the ſurface of the waters would become of a general roundneſs, as I ſaw the head of the mop do when the maid left off trundling it. And now it ſeems plain that the Almighty muſt have made the earth as much higher about the equator, as the land is about thoſe places near the poles, becauſe the earth's quick motion about the equatorial parts would cauſe the waters to riſe there. For, I ſee by the globe, that there are great quantities of land about the equator, and many ſmall iſlands in the ſeas, which are not overflowed.

P. The more you know of theſe matters, my dear, the greater reaſon you will have to admire the power, and adore the wiſdom and goodneſs of the Deity.

S. Indeed, I believe I ſhall. But pray, Sir, inform me how many miles of the earth is land, and how many are covered by the ſeas.

P. The ſurface of the earthy part of our great globe is politically divided into four great ſpaces, named *Europe*, *Aſia*, *Africa*, and *America*; as you ſee them laid out on the globe.

According to meaſurement of the beſt maps, the ſeas and unknown parts of land contain 160,522,026

ſquare miles; the inhabited parts 38,990,569; namely,

Europe,	4,456,065
Aſia,	10,768,823
Africa,	9,654,807
America,	14,110,874

In all 199,512,595 ſquare miles on the whole ſurface of our globe.

S. I admire the prodigious bulk of the earth; but infinitely more ſo, the Power that muſt have put it in motion at firſt.

P. Nothing is great or ſmall but in compariſon. We are very big, when compared with animals which can be ſeen only by the help of a microſcope: the earth is big indeed, when compared with ourſelves who live upon it: the planet Jupiter is a thouſand times as big as our earth, and the ſun is a thouſand times as big as Jupiter. If you ſo juſtly admire the Power that put our ſmall planet, the earth, into motion; how much more muſt you admire the Power which gave motion to the whole planetary ſyſtem!

Dialogue the Second.

S. WILL you have the goodneſs, Sir, to permit me now to repeat my query: *To what is the ſun fixed?* For you have convinced me that he does not move round the earth.

P. The ſun, my love, is not fixed to any thing; nor is it requiſite he ſhould. I told you, that the falling of bodies to the earth is ſolely cauſed by the earth's attraction.

S. I remember it very well, Sir; and their falling toward the earth's centre, on all ſides of it, is a demonſtrative proof of the earth's attraction. For what elſe could poſſibly determine bodies to fall, on oppoſite ſides of the earth, in directions quite contrary to one another?

P. Right, my boy, you are a philoſopher already: and I ſhall have great pleaſure in teaching you, at leaſt, the rudiments of aſtronomy.

The tendency of bodies to fall, is called their *gravitation*; and the power which gives them that tendency

tendency is called *attraction.* Now, ſuppoſing the ſun to be the only body that exiſts in univerſal ſpace; and that he is put into any part of open ſpace; to what other part of ſpace do you think he would fall?

S. I think he could not fall to any other part of ſpace at all, becauſe there would be no other body to attract him: and therefore, I imagine, he would always remain where he was placed, *ſelf-balanced on his centre.*

P. Your obſervation is ſtrictly juſt. And now, to lead you further on, I tell you, that the ſun's attraction reaches many millions of miles all around him; and that all bodies attract each other according to their reſpective quantities of matter. I have already told you that the ſun is a million of times as big as the earth: and as the ſun and earth are within the reach of each other's attraction; whether do you think, that the ſun ſhould fall to the earth, or the earth to the ſun?

S. I think, that if the ſun contains as much more matter than the earth, as he is bigger than the earth, it is a million of times more reaſonable, that the earth ſhould fall to the ſun, than that the ſun ſhould fall to the earth.

P. Right

P. Right again, my dear boy; but I muſt inform you, that the ſun is not ſo denſe a body as the earth; and therefore he does not contain as much more matter than the earth, as he is bigger than the earth. But his quantity of matter is more than 200,000 times as great as the earth: and, conſequently, he attracts the earth more than 200,000 times as ſtrongly as the earth attracts him.

S. Then I ſhould think, that the ſun and the earth would naturally fall toward each other, and come together at laſt: only that the earth would fall 200,000 times as faſt toward the ſun, as the ſun would toward the earth.

P. And ſo they would, if there were nothing to hinder them.

S. Pray, Sir, what hinders them?

P. I will begin to anſwer your queſtion by aſking one. Did you ever put a pebble into a ſling, and whirl it round your head?

S. Yes, Sir, this morning.

P. And did you feel no tendency in the pebble to fly off from the ſling?

S. O yes! and the moment I let the ſtring ſlip from my hand, away flew the pebble. I likewiſe remember,

remember, that the faſter I whirled the ſling, the greater was the tendency of the pebble to fly off; and that I was obliged to pull the ſtring ſo much the ſtronger to keep the pebble from flying off.

P. That obſervation will be of more ſervice to you by and by, than you at preſent think of: it will be too ſoon to tell you juſt now how it will.

S. I am almoſt impatient, Sir, to know what you are to infer from the pebble and ſling.

P. All bodies that move in circles have a conſtant tendency to fly off from theſe circles; which tendency is called their *centrifugal force*. And, in order to keep them from flying off, there muſt be an *attractive force* at the centers of theſe circles, equal to the centrifugal force of the moving bodies. The earth goes round the ſun once a year, in an orbit nearly circular: and it would as naturally fly off from it's orbit, if the ſun did not attract it, as the pebble flew out of the orbit, that is deſcribed round your head, when you quitted your hold of the ſtring.

S. This is quite new to me, Sir; for you never told me before that the earth goes round the ſun. The earth then has two motions; one round it's axis in twenty-four hours, and one round the ſun

in

in a year. Can you prove as clearly, Sir, that the earth goes round the ſun, as you have provèd that it turns round it's own axis?

P. Obſerve, my boy, if the earth had no motion round the ſun, it could have no centrifugal force, to hinder it from falling into the ſun by it's own weight, which is cauſed by the ſun's attraction.

S. I ſee that the earth's motion round the ſun is indiſpenſably neceſſary, and am therefore ſatisfied that it does exiſt. But I think the ſun would require ſome motion too, in order to give him a centrifugal force; without which, it ſeems to me, that, big as he is, the earth's attraction would pull him out of his place; for I remember, that the pebble and ſling pulled my hand ſo ſtrongly, although the pebble was ſmall, that I could not poſſibly keep my hand ſteady, whilſt the pebble was in motion.

P. Well done. The ſun really moves in an orbit as well as the earth; and the ſun's orbit is as much leſs than the earth's, as his quantity of matter is greater than the earth's. And, as both theſe bodies go round their orbits in the ſame period of time, the ſun moves as much ſlower than the earth, as his quantity of matter is greater than the earth's. So, what the ſun's motion wants in ſwiftneſs, is made up by his quantity of matter; and what the

earth

earth wants in quantity of matter, is made up by the ſwiftneſs of it's motion in it's orbit: on which account, their centrifugal forces are equal to each other's attractions; and as theſe attractions keep them from flying out of their orbits by their centrifugal forces, ſo theſe forces keep them from falling towards each other, by their mutual attractions. And this is what we call, *the* GREAT *balance of nature.*

S. This is new light to me; and delightful it is. But, although I think I underſtand it, Sir, I yet wiſh you would further explain it.

P. Certainly. You ſee here are two balls of different quantities of matter, and conſequently of different weights; and you obſerve that theſe balls are connected by a wire, which you muſt ſuppoſe to have no weight, like the immaterial line, in which the ſun and earth attract each other. Hang the wire by a thread fixed to a point, as much nearer the centre of the great ball, as the weight of the little ball is leſs than the weight of the great ball; and then, theſe balls will ſupport and balance each other. The point where the thread is fixed, may repreſent the center of a ſteel-yard, which bears the weights that are at both it's ends. And as gravity and weight are ſynonimous terms, the point where the thread is fixed, is not improperly termed the *center* of gravity of the two balls.

S. I under-

S. I underſtand you perfectly well, Sir; and am much obliged to you for the pains you have taken to make every thing ſo plain to me.

P. And now, if you twiſt the thread by which the wire and balls are ſuſpended, the untwiſting of the thread will cauſe them both to go round; the great ball in a ſmall circle, and the little ball in a large circle; and the center of gravity between them will remain at reſt.

S. From which I infer that the center of gravity is a motionleſs point.

P. Your inference is right.

S. I was juſt going to aſk a queſtion, but am very glad a lucky thought prevented me.

P. Never fear, but ſpeak out, right or wrong: if you are wrong, I will not laugh at you; I will put you right. Pray what was your intended queſtion?

S. As we are obliged to hang the wire and balls by a thread, to ſupport their center of gravity; I was juſt about to aſk what is it that ſupports the center of gravity between the earth and ſun?

P. Well: and what was the lucky thought that prevented your aſking that queſtion?

S. I imme-

S. I immediately recollected, that we muſt ſupport the center of gravity between the two balls; becauſe, otherwiſe, they would have fallen to the great earth by the power of it's attraction. But, as there is no greater body than the ſun and earth to attract them, they could fall no way but toward each other: and therefore, the common center of gravity between them needs nothing to ſupport it.

P. If you had aſked the queſtion, I ſhould have told you the very ſame thing.

S. You have already told me, Sir, that the earth is a planet; and that there are other planets beſides, which go round the ſun.

P. Yes; there are ſix beſides our earth: named, *Mercury*, *Venus*, *Mars*, *Jupiter*, *Saturn*, and *Georgium Sidus*.

S. Then our ſun muſt be their ſun too.

P. It is really ſo; and enlightens them all.

S. I could never believe that the Almighty does any thing in vain; and therefore I begin to think, that all the other planets are inhabited as well as our earth. For, to what purpoſe could the ſun ſhine upon lifeleſs lumps of matter, if there were no rational creatures upon them, to enjoy the benefit of his light and heat.

P. Ay,

P. Ay! Why indeed? And I will tell you one thing more, which will confirm your belief that they are inhabited. They turn round their axes, as our earth turns round it's axis; for which plain reason, they have days and nights as our earth has: and those which are furthest from the sun, and which, consequently, have much less light than our earth has, have moons to enlighten them: *Jupiter* has four moons; *Saturn* has seven*; and *Georgium Sidus*, two.

S. To me this is a proof of their being inhabited; but pray, Sir, do all the planets go round the sun in a year, as our earth does?

P. No: those nearest the sun go soonest round him.

S. Do they all move round the center of gravity, between the sun and themselves, as round a fixed point.

P. They do.

S. Then, as the times of their going round the sun are so various, I cannot see how the sun can describe any regular circle round the common center of gravity between him and them all. For, in

* Of these, the two nearest to Saturn were lately discovered by Dr. Herschel.

order that the ſun ſhould move regularly round ſuch a circle, I think all the planets would need to be joined in one maſs.

P. 'Tis very true, my clever fellow; and we muſt proceed by degrees. What I ſhowed you was only on ſuppoſition, that there is but one planet belonging to the ſun. But as there are ſeven belonging to him, and going round him in very different periods of time, he is only agitated (as it were) round the common center of gravity of the whole ſyſtem; and deſcribes no regular circle round it; but is ſometimes nearer to it, and at other times further from it, according as he is attracted by a greater or ſmaller number of planets toward any ſide of the heavens.

S. In what time, Sir, do all the planets go round the ſun?

P. *Mercury* goes round in about 3 months.

Venus - -	$7\frac{1}{2}$ months.
The Earth - -	$365\frac{1}{4}$ days.
Mars - -	2 years.
Jupiter - -	12 years.
Saturn - -	30 years.
Georgium Sidus	83 years.

They all move round the ſun the ſame way; from Weſt, by the South, to Eaſt.

S. And

S. And do you know their diſtances from the ſun?

	Millions of Miles.
The mean diſtance of *Mercury* is - -	37
That of *Venus* - -	69
The *Earth* -	96
Mars - -	146
Jupiter - -	500
Saturn -	916
Georgium Sidus	1832

S. The diſtances are ſo immenſely great, that I can form no ideas of them.

P. Great as you may think them (and to be ſure great they are), yet ſome of the comets go almoſt ſeven times as far from the ſun as the *Georgium Sidus* is. For if any comet ſhould go as near to any ſtar as it is to the ſun, when furtheſt from him, it would be as much attracted by that ſtar as it is then by the ſun; and it's motion being then toward the ſtar, it would go on, and become a comet to that ſtar; and we ſhould never hear of it any more. And now, my boy, what do you think of the diſtance of the ſtars?

S. I am loſt in wonder! But, Sir, ſuppoſing there were no comets, pray is there any other way by which we might know, that the diſtance of the ſtars is ſo inconceivably great?

P. The earth goes round the ſun every year, in an orbit, which is 192 millions of miles in diameter. Therefore we are 192 millions of miles nearer to ſome of the ſtars juſt now, than we were half a year ago, or ſhall be half a year hence: and yet, for all that, the ſame ſtars ſtill appear to us of the ſame magnitude, and at the ſame diſtance from each other; not only to the bare eye, but alſo when viewed by the niceſt made inſtruments; which ſhows very plainly, that the whole diameter of the earth's orbit—that 192 millions of miles, are but a point in compariſon to the diſtance of the ſtars.

S. All further proofs of the almoſt infinite diſtance of the ſtars would be ſuperfluous. But you were ſpeaking of comets juſt now, Sir; pray, are they not dangerous? We are always frightened when we hear of their appearing, leſt their fiery trains ſhould burn the world.

P. That is owing to not knowing better. The orbits of the planets are nearly all in the ſame plane (as if they were circles drawn on a flat board), but the orbits of the comets are elliptical, and all of them ſo oblique to the orbits of the planets, and alſo to each other, that no comet can ever touch a planet. And, as to the appearances, called the tails of the comets, they are only thin vapours ariſing from the comets, which could not hurt any planet, if it

ſhould

ſhould happen to go through that vapour, when the comet is croſſing the plane in which the planet's orbit lies. If theſe trains were fire, we could not ſee any thing through them that is beyond them. For, if you hold a candle between you and any object, you cannot ſee that object through the flame of the candle; but the ſmalleſt ſtars are ſeen through the tail of a comet.

S. Thank you, Sir; this is comfortable doctrine. Conſidering how far the planets are from the ſun; and in what times they go round him, they muſt move very faſt in their orbits. I ſhould be glad to know how many miles they move every hour.

		Miles, per hour.
P.	*Mercury* moves in his orbit, about	110,000
	Venus - - -	80,000
	The Earth - -	68,000
	Mars - - -	55,000
	Jupiter - - -	30,000
	Saturn - -	22,000
	Georgium Sidus -	15,107

S. And we are carried 68,000 miles every hour, along with the earth, in open ſpace, without being in the leaſt ſenſible of that rapid motion.

P. We are indeed, my love.

S. Pray, Sir, what are the magnitudes of the ſun and planets?

P. The ſun's diameter is 890,000 miles; and his magnitude is nearly $1\frac{1}{2}$ million times larger than the earth, and about 500 times larger than all the planets together. But the magnitudes of the planets, when compared with the ſun, may be better comprehended, by ſuppoſing the ſun to be two feet in diameter: thus, if

The *Sun* be	-	2 feet, in diam.
Mercury will then be		$\frac{1}{15}$ of an inch.
Venus	- -	$\frac{1}{7}$
The *Earth*	-	$\frac{1}{5}$
Mars	- -	$\frac{1}{12}$
Jupiter	-	$2\frac{3}{4}$ inches.
Saturn	- -	$2\frac{1}{10}$ inches, and
Georgium Sidus		1 inch.

The moon's mean diſtance from the earth's centre is 240,000 Engliſh miles; her diameter is 2170 miles; ſhe moves (with reſpect to the earth) 2290 miles in her orbit every hour; and ſhe goes round the earth from change to change, in about $29\frac{1}{2}$ days.

I will now write you a table of the moons, of *Jupiter, Saturn, and Georgium Sidus.*

	Miles from the Primaries.	Periods. d.	h.	m.	sec.
First moon of *Jupiter*	266333	1	18	28	36
Second - - - -	423000	3	13	18	50
Third - - - -	673666	7	3	59	40
Fourth - - - -	1190666	16	18	5	6
First moon of *Saturn*	not deter.	not deter.			
Second - - - -	not deter.	not deter.			
Third - - - -	346125	1	21	18	30
Fourth - - - -	338750	2	17	41	30
Fifth - - - - -	585006	4	12	25	12
Sixth - - - - -	1404000	15	22	41	15
Seventh - - - -	4212000	79	7	48	0
First moon of *Georgium Sidus* - -	289650	8	17	1	19
Second - - - -	388395	13	11	5	1

None of these thirteen *secondary* planets can be seen by the inhabitants of the earth without telescopes.

S. Pray, Sir, what can you tell me of *Saturn's Ring?*

P. *Saturn* is encompaſſed by a broad thin *ring*, ſet edge-ways round it, and the diſtance of the ring from the planet, is 20,000 miles, equal to the breadth of the ring. The ſun ſhines for almoſt fifteen of our years together on the northern ſide of the ring, then goes off, and ſhines as long on the ſouthern ſide of it: ſo that there is but one day and one night on each ſide of the ring, in the time of Saturn's whole revolution, which takes, you know, almoſt thirty of our years. Saturn's ſeven moons move round him on the outſide of the ring, which Dr. Herſchel has found to be double.

S. You told me, Sir, that the other planets turn round their axes, as our earth does: pray do they all turn round eaſtward, ſo as to cauſe the ſun and ſtars to appear to go round weſtward; and in what times do they turn round?

P. By viewing them with good teleſcopes, we ſee ſpots upon moſt of them, which adhere to their ſurfaces, and appear and diſappear regularly on their oppoſite ſides. By the motion of theſe ſpots which are all eaſtward, we know that *Venus* turns round her axis in 23 hours, 20 minutes. *Mars* turns round in 24 hours, 40 minutes, of our time; and *Jupiter* in 9 hours, 56 minutes; and Dr. Herſchel has lately diſcovered, that *Saturn* revolves round his axis in about $10\frac{1}{4}$ hours. The time that

Georgium

Georgium Sidus turns on his axis is not yet known. The *Sun* alſo turns round his axis in 25 days, 6 hours, from Weſt to Eaſt.

S. Why ſhould the ſun turn round? for, as he is the fountain of light, he can have no days and nights.

P. To turn away his dark ſpots from long facing the planets, and thereby to diſpenſe his light the more equally all around him to the planets. This has been a long converſation, but I wiſh to inform you, that the ancient poets named

Mercury, the *meſſenger of the gods*, on account of his rapid movement.

Venus, the *goddeſs of beauty*, from her being the moſt beautiful ſtar in the heavens.

Mars was named the *god of war*, from his ſanguinary appearance.

Jupiter, the *god of thunder*.

Saturn, the *god of time*.

S. Sir, I wiſh you a good morning, and gratefully thank you.

Dialogue the Third.

S. I REMEMBER, Sir, you told me that Mercury moves in his orbit 110,000 miles every hour; and Saturn only about 22000. I obſerved alſo, that the further the planets are from the ſun, they not only take longer times to go round him, but alſo move ſlower in every part of their reſpective orbits. Pray, what *reaſon* can you aſſign for this?

P. The nearer that any planet is to the ſun, the more ſtrongly it is attracted by the ſun; therefore, thoſe planets which are the nearer to the ſun, muſt move the faſter in their orbits, in order thereby to acquire centrifugal forces, equal to the power of the ſun's attraction; and thoſe which are the further from the ſun muſt move the ſlower, in order that they may not have too great a degree of centrifugal force, for the weaker attraction of the ſun at thoſe diſtances.

S. Then I underſtand, that the ſun's attraction, at each particular planet, is equal to the centrifugal force of each planet; and, by that mean, the planets are all retained in their reſpective orbits.

P. It is accurately ſo.

S. Then,

S. Then, as the *power* of the Deity is manifeſt, in having ſet off ſuch large bodies as are the planets, with ſuch amazing degrees of velocity; ſo his *wiſdom* is conſpicuous, in having ſo exactly adjuſted their velocities, and conſequently, their centrifugal forces, to the different degrees of the ſun's attraction at the diſtances the planets are from him. Here is a wonderful *balance* indeed! Pray, Sir, does the power of the ſun's attraction decreaſe in proportion as the diſtance from him increaſes?

P. No, my dear; his attractive force diminiſhes in proportion as the ſquares of the diſtances from him increaſe. So that, at twice the diſtance from the ſun's centre, his attractive force is 4 times leſs; at thrice the diſtance, it is 9 times leſs; at four times the diſtance, the attraction is 16 times leſs; and ſo on. And this we find from the comparative diſtances of the planets from the ſun, and their different velocities in their orbits.

S. I ſhould be glad to know the *reaſon* why the ſun's attraction decreaſes, in proportion to the ſquares of the diſtances from him.

P. My dear, you aſk me a queſtion which SIR ISAAC NEWTON could not ſolve; although he was the prince of philoſophers.

S. But,

S. But, pray Sir, can you give me no idea at all of it?

P. I could; and a very plain one too: if the attractive force (the effect of which we call gravity) acted only according to the *ſurface* of the attracted body.

S. If gravity acts not according to the quantity of ſurface, pray, how does it act?

P. Exactly in proportion to the *ſolid contents* of bodies; for were you to weigh a plate of metal, and then divide it into any number of equal parts; if you lay theſe parts above one another in the ſcale, they will be juſt as heavy as they were, before divided.

S. Then it ſeems, Sir, that there is no way of accounting for the manner, in which gravity acts, only by reſolving it into the will of the Deity.

P. Indeed there is not. And, therefore, when I henceforth ſpeak of gravity, I would have you always underſtand, that I do not thereby mean a *cauſe*, but the *effect* of a *cauſe*, which we do not comprehend. Now, my love, I will inform you, that the light of the ſun, or of any other luminous body, decreaſes in proportion as the ſquare of the diſtance, from the luminous body, increaſes. The

rays

rays of the ſun's light go out in ſtraight lines from all points of the ſun's ſurface: and, conſequently, the further they go off from the ſun, the more they ſpread.

S. Pray, Sir, how is it known that light moves in ſtraight lines?

P. Becauſe we cannot ſee a lighted candle through the bore of a bended pipe; but we can through a ſtraight pipe.

S. As the comparative diſtances of all the planets from the ſun are known, I make no doubt but you can tell me what are the comparative quantities of the ſun's light and heat on all the planets.

P. Very eaſily. The ſun's light and heat is 7 times as great on *Mercury* as on the earth; about twice as great as *Venus*; at *Mars* not $\frac{1}{2}$ ſo ſtrong as on the earth; *Jupiter* receives only $\frac{1}{27}$ part of the light and heat that the earth does; *Saturn* about $\frac{1}{90}$ part; and *Georgium Sidus* $\frac{1}{370}$.

S. It ſeems to me, Sir, that the inhabitants of the neareſt planets to the ſun muſt be blinded by too much light; and that thoſe of the furtheſt planets live almoſt in darkneſs.

P. Your

P. Your reflection is very natural; but I muſt aſk you a queſtion or two.

S. Pray do, Sir.

P. After you have been a while out in the ſnowy ſtreet, can you ſee as well to read, immediately on coming into your room, as you did before you went out?

S. No, Sir.

P. Can you bear the ſtrong reflection of the ſun's light from the ſnow, juſt as well, when you go into the ſtreet, as when you have been walking half an hour in it?

S. No, Sir.

P. Can you give ſuch a ſatisfactory reaſon for this as would ſatisfy a philoſopher? For you know that the ſnow reflects not leſs light for your having been a while walking in it; nor is your room the darker for your not having been out of it.

S. Indeed I cannot anſwer theſe queſtions.

P. Then I will tell you. Our eyes are made ſo, that their pupils dilate, when the light is weak, that they may take in more of it; and contract, when the light is ſtrong, that they may admit the fewer

fewer of it's rays. Whilſt you are in a room, the pupils of your eyes are dilated; and for that reaſon, when you go out, they take in too much of the light reflected from the ſnow, which you find is painful. But they ſoon contract, ſo as to admit no more of that ſtrong light than you can eaſily bear. And then, when you come into your room, with the pupils of your eyes contracted, the room being not ſo light as the ſtreet, appears darker to you than it did before you went out: but, in a ſhort time, the pupils dilate again; and then they let in a ſufficient quantity of light, by which you can read.

Now, ſuppoſing all the other planets to be inhabited by ſuch beings as we are; if the pupils of their eyes, who live on the planet Mercury, are ſeven times as ſmall as ours, the light will appear no ſtronger to them there, than it does to us here.

And if the pupils of their eyes who live on Saturn, are 90 times as large as ours, the light there will be of the ſame ſtrength as it is to our eyes here. How many full moons, my boy, do you think there would need to be placed in a clear ſky, to afford us moon-light, equal to common day-light, when the ſun does not ſhine out?

S. Perhaps ſixty; or an hundred, at moſt. For when the full moon is not clouded, ſhe ſhines ſo clearly,

clearly, that I can read a ſmall printed book by her light.

P. Indeed you are greatly miſtaken: for it would require 90 thouſand; and *that* number would fill the whole of our viſible ſky.

S. You amaze me, Sir! but pray, how can you find any method of comparing moon-light with day-light, ſo as to aſcertain the great difference between the quantities thereof?

P. Have you never obſerved the moon pretty high in the morning, after the ſun was riſen, when the moon was about three quarters old?

S. Yes, Sir: and when I have ſeen her, as it were, among whitiſh clouds, ſhe appeared much of the ſame colour as they did; very dim, in compariſon with what ſhe appears in the night.

P. And yet, ſhe was juſt as bright then as ſhe is in the night; only the ſuperior light of the day made her ſeem ſo much otherwiſe. Like a candle, which appears very bright in the night; but place it in the ſtreet in day-light, and it will ſeem very dim, although it's real brightneſs is ſtill the ſame.

S. Pray, Sir, proceed.

P. When the ſun is hidden by clouds, all the light we have is by reflection from them. The moon

moon reflects the ſun's light in the night, as the clouds do in the day: and as ſhe can reflect no more light in the day than a ſmall whitiſh cloud does, that covers as much of the ſky as the moon covers; ſhe can reflect no more in the night. And as the full moon fills only a 90 thouſandth part of the ſky, her light is no more than equal to a 90 thouſandth part of common day-light. Now, as the light of the ſun at Saturn is equal to a ninetieth part of his light at the earth, and common day-light at the earth is 90,000 times as great as moon-light; divide 90,000 times by 90, and the quotient will be 1000; which ſhows, that the ſun's light at Saturn is 1000 times as great as the light of the full moon is to us.

S. I ſee plainly that it muſt be ſo: but pray, Sir, did not you mention the light's *going* from one place to another, as if it took ſome time in moving through open ſpace. I know that ſound does ſo; becauſe I have ſeen the flaſh of a diſtant cannon before I heard the noiſe that it made.

P. True, my love; but you did not ſee the flaſh at the *inſtant* is was given, though you ſaw it *very* ſoon after.

S. Pray, Sir, do you know with what degree of ſwiftneſs light moves?

P. Yes; and you ſhall ſoon know too. The earth's orbit lies far within the orbit of Jupiter.

S. Undoubtedly; becauſe Jupiter is much further from the ſun than the earth is.

P. Then you know, that when the earth is between Jupiter and the ſun, the ſun and Jupiter appear oppoſite to each other in the heavens. And when the ſun is nearly between us and Jupiter, the ſun and Jupiter appear nearly in the ſame part of the heavens.

S. Certainly, Sir.

P. Therefore, when the ſun and Jupiter appear almoſt cloſe together, the earth is almoſt the whole diameter of it's orbit further from Jupiter, than when it and Jupiter appear oppoſite to each other in the heavens.

S. Yes, Sir.

P. The times when Jupiter's moons muſt be eclipſed in his ſhadow are eaſily calculated; becauſe by teleſcopic obſervations, the times in which they go round him are accurately known; and the apparent vaniſhing of theſe moons in the ſhadow may be very well perceived through a teleſcope; or the inſtants when they recover their light again, by the

ſun's

ſun's ſhining upon them, at their going out of the ſhadow. And it has been always obſerved, ſince teleſcopes were invented, that theſe eclipſes are ſeen ſixteen minutes ſooner when the earth is nearest to Jupiter, than when it is furtheſt from him: which ſhows, that light takes ſixteen minutes to move through a ſpace equal to the diameter of the earth's orbit, which is 192 millions of miles. And, conſequently, it muſt take eight minutes in coming from the ſun to us.

S. I underſtand this, Sir; but——

P. But what?

S. The rays of the ſun's light come directly from him to the earth; but his rays from Jupiter's moons come to us only by reflection. Now, Sir, is it known that reflected light moves with the ſame velocity that direct light does?

P. There is no reaſon to believe but that it does. For, if the particles of light did not fly off from the planets as faſt as they came upon them, there would ſtill be an accumulation of light upon them; which would make them appear every night *brighter* and *brighter*; but, in reality they do not. And if the light flew off faſter from the planets than it comes

upon them, they would appear *dimmer* and *dimmer* every night, which is not the caſe.

S. But pray Sir, are *all* the rays which the ſun darts on any planet *reflected* from it, and none of them abſorbed in the matter of which the planet is compoſed? Or, if *ſome* of them be abſorbed, will not this invalidate your argument?

P. Not at all, if the abſorbed rays bear a conſtant proportion to the *whole* number of rays by which the planet is ſucceſſively illuminated; and this muſt undoubtedly be the caſe; for ſome parts of the planet's ſurface which either reflect or abſorb the rays that fall upon them *this* moment, will be equally diſpoſed to reflect or abſorb the rays that fall upon them in the *next*; and ſo the *ſame proportion* between the abſorbed and reflected rays, or between them and the whole quantity of light thrown on the planet, will be continually preſerved.

S. But if ſome parts of the planet's ſurface be more hardened by drought, or ſoftened by wet, as on our earth; or be in any other reſpect more diſpoſed, either to reflect, or abſorb the ſun's rays at ſome times than at others; would not this vary the proportion you have mentioned?

P. If

P. If we may judge of this from our own globe, where the contrary qualities of drought and wet, hardneſs and ſoftneſs, ſmoothneſs and roughneſs of ſome parts of it's ſurface, ſo far as they reſult from any alterations of the *weather*, &c. if taken upon an average for a whole year, or other given time, and throughout any half of the earth's ſurface; they will, very nearly, if not exactly, balance each other. The ſame may be therefore ſuppoſed to hold good in the other planetary worlds; and ſo the proportion before mentioned will not be ſenſibly altered.

S. You have quite removed my difficulties, Sir. But, as light comes from the ſun to the earth in eight minutes, it muſt move very ſwiftly. Let me ſee *how* ſwiftly. The ſun's diſtance from the earth is 96 millions of miles; and light moves through that ſpace in eight minutes of time: I therefore divide 96,000,000 by 8, and the quotient is 12,000,000 the number of miles that light moves in a minute. Now, Sir, I remember that you told me, a cannon-ball moves at the rate of 480 miles in an hour, which is eight miles in one minute; I therefore divide 12,000,000 by 8 and the quotient is 1,500,000: ſo that light moves a million and half of times as ſwift as a cannon-ball. Amazing indeed!

P. It is ſo: and full as amazing is the *inconceivable ſmallneſs* of the particles of light.

S. Pray, Sir, how is it known that they are ſo inconceivably ſmall.

P. Thus, my dear. The force with which a body ſtrikes any obſtacle, is directly in proportion to the quantity of matter in the body, multiplied by the velocity with which it moves. And, conſequently, as the velocity of light is a million and half of times as great as the velocity of a cannon ball, if one million and half of the particles of light were but as big as a common grain of ſand, we could no more keep our eyes open to bear the impulſe of light, than we could to have ſand ſhot point blank againſt them from a cannon.

Again. Let a lighted candle be ſet on the top of a ſteeple's ſpire, in the night, and there will be a very large ſpherical ſpace filled with the light of the candle before a grain of the tallow be conſumed; and as *that* grain of tallow is divided into ſo many particles, as to fill all the ſpace into which the light is diffuſed, can you poſſibly imagine how ſmall the particles are into which it is ſo divided?

S. Indeed, Sir, I can form no idea thereof.

P. A very good computiſt has found, that the particles of blood of thoſe animals which can only be ſeen by means of a microſcope, are as much ſmaller

ſmaller than a globe, whoſe diameter is a tenth part of an inch, as that ſmall globe is leſs than the whole earth. And yet their particles are like mountains to a grain of ſand, when compared with the particles of light.

Dialogue the Fourth.

S. If the moon were big enough to be ſeen by an obſerver placed on the ſun's ſurface, pray, Sir, would not ſhe always appear to that obſerver as a full moon does to us.

P. Yes, my dear, ſhe certainly would; becauſe, whichever ſide of her is turned toward the ſun at any time, *that* ſide would be fully enlightened by the ſun.

S. And I imagine, that if an obſerver were placed on the ſide of the moon which always keeps toward the earth, the earth would appear to him in all the different forms that the moon does to us. Only, that when the moon is *new* to us, the earth

would be *full* to the moon; and when the moon is *full* to us, the earth would diſappear, or be *new* to the moon.

P, What reaſon have you for thinking ſo, my boy?

S. Becauſe whichever ſide of the earth or moon is turned toward the ſun at any time, that ſide is then enlightened by the ſun. And therefore, when the dark ſide of the moon is toward the earth, the enlightened ſide of the earth is then fully toward the moon; and muſt appear to her like a large full moon. And when the enlightened ſide of the moon is fully toward the earth, the dark ſide of the earth is toward the moon, and therefore it cannot appear to the moon. Alſo when the moon appears half full to us (or in her firſt quarter) the earth muſt appear half decreaſed to the moon, being then half-way between it's full and change, as ſeen from her. And when the moon is in her third quarter as ſeen from the earth, the earth muſt appear in it's firſt quarter to the moon, it being then the middle time between the new and full earth, as ſeen from the moon.

P. You are exactly right, my dear; and as the ſurface of the earth is 13 times as large as the moon's

moon's ſurface, when the earth is full to the moon, it's ſurface appears 13 times as big to the moon, as the ſurface of the full moon does to us.

S. The moon, Sir, goes round the earth every month; and as the earth goes round the ſun in a year, the moon muſt do ſo too. Pray how happens it, that the earth, by moving at the rate of 68,000 miles every hour, in it's orbit, does not go off, and leave the moon behind?

P. The moon is within the ſphere of the earth's attraction; and, therefore, let the earth move in it's orbit as faſt as it will, the moon muſt accompany it. For you know, that if you put a pebble into a ſling, and whirl it round your head, the pebble will go round and round your head, whether you ſtand ſtill in the ſame place, walk forward, or go round the circumference of a large circle. And the tendency of the pebble to fly off, and the force with which you hold the ſtring to confine the pebble in it's orbit, will be the ſame in one caſe as in the other.

S. I thank you, Sir, for having ſet me right; and at the ſame time for convincing me by the ſimile, that the moon's centrifugal force is equal to the power by which the earth attracts her, and thereby retains

retains her in her orbit; for, if her centrifugal force were greater than the earth's attraction, ſhe would fly out of her orbit, and ſo abandon the earth: and if her centrifugal force were leſs than the power by which the earth attracts her, ſhe would come nearer and nearer the earth in every revolution, and would fall upon it at laſt.

P. I find, my dear boy, that you very ſeldom need to be ſet right; and when I do, you always improve upon it, by making further obſervations.

S. You are very kind to encourage me, Sir. But it ſeems that the moon goes juſt round her orbit between change and change; and yet, I think, that as both the earth and moon go round the ſun in a year, the moon muſt not only go round her orbit between change and change, but even advance as many more degrees as the earth has moved in it's orbit during that time, in order to be again in conjunction with the ſun. For, in whatever part of the dial-plate of my watch, I find the hour and minute-hands in conjunction, I obſerve that the minute-hand muſt go as much more than round to the ſame point again, before it overtakes the hour-hand, as the hour-hand advances in the interval between it's laſt conjunction with the minute-hand and it's next.

P. You

P. You are right, my love, and your inference from the hour and minute-hands of the watch are full as good as mine from the pebble and ſling.

S. Pray, Sir, in what time does the moon go round her orbit from change to change?

P. In twenty-nine days, twelve hours, forty-four minutes and three ſeconds.

S. And what is her diſtance from the earth's centre?

P. Two hundred and forty thouſand Engliſh miles.

S. How many times, Sir, would it take round the earth, to go round the moon's orbit?

P. Sixty times: and therefore, every degree of the moon's orbit is equal in length to ſixty degrees of a great circle on the earth's ſurface.

S. Pray what is the moon's diameter?

P. About 2180 miles.

S. What are thoſe ſpots which we ſee on the moon? I think I have heard that they are ſeas.

P. So

P. So they were thought to be, before there were good teleſcopes to view the moon by. But now they are found to be only darker places of the land in the moon, which do not reflect the ſun's light ſo copiouſly as the whiter parts. For we ſee that they are full of pits and deep vallies: but if they were ſeas, they would have even and ſmooth ſurfaces.

S. Certainly, Sir. But it may be known by theſe ſpots whether the moon turns round her axis; if ſhe does, I ſhould be glad to know in what time; becauſe I ſhould thereby know the length of her days and nights.

P. She turns round her axis exactly in the time ſhe goes round her orbit; and that we know by her keeping always the ſame ſide toward the earth.

S. Then, Sir, ſhe can have only one day and one night between change and change, or in 29 days, 12 hours, 44 minutes, 3 ſeconds, of our time.

P. Exactly ſo.

S. You ſay, Sir, that the time from change to change is 29 days, 12 hours, 44 minutes, 3 ſeconds: pray in what time does the moon go round her orbit?

P. In

P. In 27 days, 7 hours, 43 minutes, 5 ſeconds.

S. And how far does the earth move in it's orbit between change and change of the moon?

P. Twenty nine degrees, 6 minutes, 25 ſeconds.

S. Then 'tis plain that the moon goes 29 degrees, 6 minutes, 25 ſeconds, more than round her orbit.

P. True, my dear; and now obſerve, that the moon's *going round her orbit* is named, *her* PERIODICAL REVOLUTION; and her *going round from change to change*, is named her SYNODICAL REVOLUTION.

S. Sir, I thank you moſt ſincerely.

The Earth a Globe.

My love, the elements obſerve their bounds;
But earth and water in one body join,
Within one frame of mutual union orb'd:
Yet ſeparate and free; both bent alike
By *gravitation* to a ſpheric form,
Which all, that to a centre tends, affects.
Yes, reaſon teaches *earth* to be a *globe*;
But, if the ſenſe appear a ſafer guide,
Signs are not wanting to evince the truth:
For, if the face of earth were wholly plain,
The ſun not ſooner would ſalute the eaſt,
Than Cadiz would be brighten'd by his ray:
And, at his ſetting, night would ſhroud at once,
With her black wings, all nations of the globe,
On the broad ſurface of that mighty plane.
Now, by degrees, Aurora breaks the ſhades;
And, when the golden lamp wakes from his couch
The ſoft inhabitant of Ind, night's dew
Riſes in weſt; when ſhe involves in gloom
The Indian regions, ſplendid radiance ſpreads
On the fair brow of the Heſperian land;
Slower to theſe, and earlier to thoſe,
Since earth, with curve inſenſible, aſcends,

Preſenting

Preſenting the ſucceſſive beams of day:
Nor leſs th' eclipſes of the moon will prove;
When to her brother's rays oppos'd, ſhe veils
Her countenance in melancholy duſk;
For when with us in early night obſcur'd,
At midnight Perſia views her darkened orb.

Why if the earth were plane, when the eclipſe
Is partial, is the line of darkneſs curv'd?
For ſtill the ſhadow gives intelligence
Of that from whence it flows; triangular,
When from a triangle it comes; and ſquare,
Or an oblong rectangle, when it ſtrikes
Projected from a ſquare: the globular
Caſts a round ſhadow ever; but the plane,
If circular, oft ſtrikes into ellipſe.
Therefore, ſince ſtill the ſhadow, which is caſt
From the earth's body on the moon, is round,
Conclude the earth a globe; and ſee the truth.

And hence too, that the earth's declivity
On either ſide preſents a ſphère, we learn;
For, as we journey further to the ſouth,
The Cynoſure ſinks nearer the North Pole,
If northward more, then the reſplendent Wain
Riſes: and thus the correſpondent heav'n
Anſwers our progreſs on the convex earth.

Nor let it move thee, that ſome parts riſe high
In mountains; others ſink into deep vales:
Each way conformable to human uſe.
Theſe inequalities to us ſeem great;
But to an eye that comprehends the whole,
The tumour, which to us ſo monſtrous ſeems,
Is as a grain of ſparkling ſand that clings
To the ſmooth ſurface of a ſphere of glaſs;
Or as a fly upon the convex dome
Of a ſublime, ſtupendous edifice.

Nor leſs the wave to the ſame form aſpires,
Preſs'd by it's weight and gravitating force:
For as on land, ſo in the vaſt of ſea
The pole now riſes, and now ſinks, depreſs'd;
While ocean ſwells a portion of our ſphere.

Behold, when the glad ſhip ſhoots from the port
Upon full ſail, the hulk firſt diſappears,
And then the lower, then the higher ſails;
At length the ſummit of the tow'ring maſt
Alone is ſeen: nor leſs, when from the ſhip
The longing ſailors eye in hope the ſhore:
For then, from the top-maſt, though more remote
Than either deck, the ſhore is firſt beheld.

Nay, in the ſmalleſt drop this truth is ſeen;
Which, ſtill conſenting with the greater maſs,
Aſſumes the honours of a ſpheric form,

And

And conſtantly it's rights, as water, keeps.
Nor more the properties of fluid claims
Th' immenſe of ocean, than the dew which reſts
In liquid pearl upon the ſummer's blade;
And as this dew coils in a ſilver orb,
And as the drop dependent from each roof,
When the autumnal heaven deſcends in rain,
The ſame juſt figure conſtantly effects:
So the diffuſive fluid of the ſea
Swells convex, and preſerves an equal form.

That very law which moulds a tear,*
And bids it trickle from it's ſource:
That law preſerves the earth a ſphere;
And guides the planets in their courſe.

Geography triumphant reigns; and ſhows
The earth, and ſea, and air one perfect orb,
Self-balanc'd in the viewleſs realm of ſpace.

The Earth has Motion.

THE earth but rarely feels a ſudden ſhock:
And ſeemingly in total reſt abides:
Yet, conſtant in her motion; regular,

* The law of gravitation.

And equable, and beautifully juſt:
Daily her axe revolving; in her orb
Elliptical, completing ſtill the year:
Yet, what oppoſes our hypotheſis,
Let us a while attend. The gravity
Of this terreſtrial maſs is urg'd in proof
Of endleſs reſt and immobility;
But if a greater gravitating maſs
Compels the earth's obedience—ſuch the ſun—
What ſhall forbid her to revolve? And this,
The fair analogy ſuggeſts, beheld
Through all the planetary choir; ſcarcely
Will childhood hear th' objection, once of weight,
When dawning ſcience faintly pierc'd the gloom
Of tenfold night, to raiſe perplexity
In learned and in philoſophic breaſts.
No more we aſk, why they, if heaven is fix'd,
And earth in motion, ſtill our eyes deceive,
And ſhow us the revolving ſun and ſtars.
Aſk not the voyager to diſbelieve
The motion of his veſſel o'er the ſea,
Becauſe he feels it not, and ſees the port
Fleeting from view; while in ſucceſſive courſe
The ſhore retires, and to his eager eye
New ſhores, new harbours riſe; the traveller,
When he beholds the woods, the cities move
Ne'er thinks it real motion: of the eye
We learn appearances and truſt the ſenſe

To

To repreſent them uniformly true,
In correſpondence to their latent cauſe.

Perchance thou'lt ſay, the oracles of truth,
Do not they teach the motion of the ſun,
And the inertneſs of the ſteady earth?
Reaſon to theſe and piety command
An humble deference and prompt belief:
For he, who built the univerſe, which now
His mighty pow'r ſupports and rules,
Beſt knows the fabric, beſt can ſpeak it's laws.

With theſe objections former ages us'd
To preſs the ſyſtem by which earth is prov'd
To wheel her *annual* and *diurnal* orb:
But not the nature of external things,
The laws of the material univerſe,
Do we contend th' Almighty meant to teach
His people in the ſacred oracles;
But left to reaſon and diſcloſing time,
And what by MOSES of the world's beginning,
Is taught, we own obſcure, and known conciſe;
Leſs to philoſophy than piety
Devoted: ſtill the motion of the earth
Is not by Heaven's great oracles denied.
Will not COPERNICUS, PYTHAGORAS,
And NEWTON's ſelf, when of Phænomena
They ſpeak, conform to the appearances,
Not to the fact and philoſophic cauſe?

Thus the ſun riſes to philoſophers,
Alike of PTOLOMY or NEWTON's ſchool;
Nor calculation diſagrees in ought:
Thus to the ſubject wiſely they will ſpeak,
And thus diſtinctly to the pop'lar uſe;
In different ſtyle when they explain the truth,
And when they ſpeak of viſible effects:
Yet in this difference conſiſtent ſtill.
When of the ſyſtem, the great law they teach,
And all the lucid order, which pervades
The works of nature, then, and only then,
They quit th' appearance.

Measure of the Earth.

NOW let us ſeek the *Meaſure* of the earth.
What is the circling line which comprehends
It's ample ſphere; what the diameter
Which, through the centre from the ſurface, ſtrikes
Directly to the ſuperficial point
Oppos'd?

When on th' Aſſyrian plain, the ſage
Travel'd directly north, and number'd miles,

Thirty

Thirty twice told, and near a ſeventh beyond,
And to the polar ſtar his aſtrolabe
Directed, he obſerv'd the pole was riſen
By one degree; thence, ſouthward from the point
Whence he commenc'd his journey, travelling,
He found the pole by one degree was ſunk:
Thus long experience taught that ſev'nty miles,
One half excepted, meaſur'd a degree
On the celeſtial globe, to the convex
Of the earth transferr'd this number multiplied,
By the diviſions which the quadrant holds,
And that four times repeated, gives the earth
A great *circumference*; in ample line
Twenty-five thouſand miles, if earth poſſeſs'd
The equal figure of a perfect globe:
From thence Archimedean wiſdom takes
A *third*, and a ſmall portion adds beyond,
And thus produces the *diameter*;
Which, as a mile computes our diſtances,
Serves to compute the diſtance of each ſphere
In the great ſyſtem of our ſolar train:
Nor mountains, nor impenetrable deeps
Obſtruct the philoſophic eye: which views
The axis of our globe, and meets the line;
Howe'er to ſight inſcrutable and loſt.
O maſs
Great and ſtupendous, if the groveling ſoul
Cling ant-like to the hillock! But how ſmall
If to the ſtarry univerſe compar'd!

Even a point; an atom! Multiply
The mighty aggregate of land and ſea
Ten thouſand by ten thouſand times; proceed
Till Computation faints beneath the toil,
And Induſtry herſelf cries out 'no more;'
Still, to a little portion of the whole,
Th' amazing aggregate is like the mite
To all the planetary worlds: nor toil,
Nor penetration with her angel ken,
Can note proportion. Nor aerial capes,
Nor earth entire, is ought in eſtimate,
When balanc'd with the heavens: greater the ſpeck,
Which on the ſun-beam dances, when compar'd
With Taurus, or the Alps, or Caucaſus;
Or on the blade the dew-drop to the ſea.

Behold the *Sun*! how much in magnitude
Above the earth!
Great as he is, and to ſo many worlds
The ſource of light, ſcarce does he ſeem to us,
Full in unclouded majeſty reveal'd,
Beyond the brief dimenſions of a foot.
But, ſhould he lift thee to his flaming throne,
How from that eminence would earth appear,
If viſible; yet to the *Orb* through which
Obſequious planets move beneath his reign,
How ſmall the *Sun!* And to the STARRY WHOLE
The *Solar Syſtem* ſhrinks dimenſionleſs.

The Starry Heavens.

We ſee by night the lucid hoſt of heaven
Unveil'd; while through the gloom unnumber'd beams
Pour on the eye; and, far as mortal view
May trace, diſcloſe the palaces of gods:
Yet not too much truſt to appearances,
Whoever would behold the form of truth
In all her native beauty: for the ſenſe,
Fallacious, often deviates; till the ſoul,
Exerting her ſupreme prerogative,
Diſpel the miſt: and, brighter than the ſun,
Nature ſhines forth, reveal'd in all her charms.

If to the ſight we truſt, whatever ſtar
Strikes on the viſion from yon azure height,
Revolves in one great orb with daily whirl:
But if to ſight clear Reaſon lends her ray,
Then varied diſtances and different ranks,
And divers motions are beheld diſtinct.

Yet, though the motion, diſtance, magnitude
Of heavenly bodies thus diverſified,
'Midſt order, feaſts with rich variety

The ſtill-enquiring, ſtill-delighted mind,
We dream not that the ſtars chooſe each his courſe;
As in the ſea the finny habitants
By native impulſe, and ſelf-moving will:
For, to the movements of the living world,
Free range agrees, direct or retrogade;
Now to the right, now to the left inclin'd;
Now ſtraight, now curve; irregular and prompt
To every changing impulſe of the ſenſe:
And intervals of ſweet returning reſt
Are their's; but ever circular the curve,
Conſtant the progreſs of thoſe ſtars which move,
And undiſturb'd the ſtation of the fix'd,
Through the long period of a thouſand years;
Except ſo far as the eternal law
Of gravitation's univerſal force
May act on theſe; incredible how ſlow.
For not unſteady or precarious laws
Rule heaven; nor ſpace uncertain; nor return,
At vague, inconſtant per'od, is allow'd
To the unwearied meſſengers of light,
The planetary worlds: and, as the form
Of animals by Nature's plaſtic hand
Is to their ſeveral ſituations turn'd;
Their temper, life and ſervices deſign'd;
So to the movement of the ſtars is giv'n
Adapted ſhape, compact and uniform,
Free for progreſſion; aptly to diffuſe
Light on all ſides ordain'd; nor leſs to ſuit

Rotation,

Rotation, than for periodic courſe;
Sublime and beautiful, a ſphere complete.

Since, therefore, nor ſpontaneous motion reigns,
Nor *chance* the ſtars directs—*ideal being*
Worſhipped by credulous impiety—
But fix'd their periods, and unchang'd their laws,
Their motion conſtant, figure uniform;
Remains that *one eternal mind* preſide,
Impel, direct, and limit all their courſe.

See we how in the midſt *five* ſhining orbs
Appear to wander, circling round the *Sun*.
Firſt, *Mercury*, rarely beheld, and hid
Beneath the neighbouring radiance of his beam;
Seeming to glance upon the fervent goal
In the ſwift flight of his impatient wheel:
Then the bright Star, the harbinger of day,
Which when ſhe leads the lovely hour of *eve*,
Is *Venus*, queen of joy: inferior *Earth*
Borrows the cheering ray, O Sun, from thee,
Sovereign and parent, animating all.
Next *Mars* of fiery red; and *Jupiter*,
Of vivid luſtre in his ample orb:
Then *Saturn* with his faint and livid ray;
And laſtly, *Georgium Sidus*, lately found,
Slow moving in the ſyſtem's utmoſt bound.
Far above theſe, the GLORY OF THE HEAVENS,

With

With thouſand lights, ſheds ſplendour through the
duſk,
And drives far off the horrors of the night;
Leſt darkling, the loſt traveller ſhould err,
Or the wide ſeas the mariner deceive;
And that the wiſdom, goodneſs, power of GOD
To mortals may be known; and nature ſpeak
Her great Creator; and through all her bounds
His every work or learn, or teach his praiſe.
What, then, with theſe examples may become
Man, before whom the *Deity* hath ſet
This boundleſs ſcene? Shall he not cultivate
The ſeeds of truth and peace? Shall he not dwell
With genuine, active piety, and gain
The habit and the temper of that life,
For which he is deſign'd?—The life of gods!
Looking ſublime to the high ſeat of bliſs,
Where neither ſickneſs, grief, nor anxious care
Diſturb the pure ſerene; but eaſe ſecure,
And life, unknowing of decay or end,
And peace, and love reſide; and the great power
Eternal *virtue*, driven by our crimes
From earth to her corruptleſs manſion—heaven.
Hither our journey; here our ſacred port;
Hither diſdaining every obſtacle
Of terror or allurement, let us tend.

The Periods of the Planets.

THE PERIODS of the PLANETS to diſcern,
Nice is the toil, but not inglorious.
Firſt, winged MERCURY in haſte revolves;
Three months, with little ſpace beyond, include
His circuit: VENUS, in an ampler orb,
Meaſures *eight* months: MARS, free, expatiates
Two lunar *years:* imperial JUPITER
Nearly *twelve years*, ſuch as our annual courſe
Numbers, within his mighty orb includes:
While SATURN aſks thrice ten to move his round:
And GEORGIUM SIDUS to the marge exil'd,
Has eighty-three to fill his ſlow career.

The Sun turns on his Axis.

WE ſaid the SUN upon his axis turn'd:
This by apparent ſpots is manifeſt,
Retiring and returning to our view,
At meaſur'd periods on his orb of fire:

Sometimes

Sometimes ſo wide encroaching, that the earth
Meaſures one *third* of their diameter.
Yet not the Sun by their encroachment ſhines
With leſſened beauty, or appears to loſe
Of heat or ſplendour: as a grain of ſand
Deforms not the bright ſurface which preſents,
In ample model, this our globe of earth.

Proportion of Light and Heat on the Planets.

SEVEN times the light, which gilds our moon, inflames
The fiery ſphere of ardent *Mercury:*
While *Venus*, brilliant with a double ſhare
Of ſolar ſplendor more than beams on us,
Graces the heavens: *Mars* has but half our light
Pour'd on his denſe, refractive atmoſphere:
And *Jupiter* gains ſcarce a *thirtieth* part;
Yet quick returns compenſate, and a night
Illumin'd by four moons, aſſiduous ſtill
To ſhed ſucceſſive light, and cheer his globe
On ev'ry ſide; except the Poles alone;
And theſe the ſun never abandons far,

But

But ſojourns on the horizontal marge
In kind vicinity, indulging light:
Saturn receives about a *ninetieth* part
Of the all-cheering light on earth diffus'd;
But ſev'n refulgent moons ſolace the ſphere,
With diſtances and periods ſtrictly true
To the great law*, O KEPLER, trac'd by thee!
And how illuſtrious is the ring, which girds
His ample orb! Amazing zone of light!
Auxiliar to the circling moons that wait
Upon the wand'ring ſtar. Compar'd with earth's,
The light and heat that *Georgium Sidus* feels
Is but the fifteen ſcore and ſeventieth part.
Dear boy, adieu.

* Such as the cube of numbers that expreſs
The diſtance of each planetary ſphere,
Such is the ſquare of periodic time.

The above law was diſcovered by Kepler, on the 13th. of May, 1618.

A FEW

OBSERVATIONS

On Music.

E'en age itſelf is cheer'd by muſic;
It wakes a glad remembrance of our youth,
Calls back paſt joys, and warms us into tranſport.

Rowe.

In muſic the number of notes is 7, which are named as the firſt 7 letters of the alphabet.

If you begin with A, and ſtrike 7 ſucceſſive notes, you will come again to A; but this A is not the ſame note as that with which you began; it is an *octave* to it. Theſe 7 notes are thoſe of a peal of 7 bells: when there are 8 bells, the ſmalleſt is an *octave* to the largeſt: but if muſical inſtruments contained no other than theſe 7 notes and their octaves, they would produce no better melody than that, called ringing changes; or, at beſt, only a ſimple tune.

To

To render muſical inſtruments more comprehenſive, middle notes, named *half-notes* were introduced, each ½ a tone higher than the note below it; and therefore ½ a tone lower than the note above it: in conſequence of this arrangement, the *whole octave*, conſiſts of 12 *half-notes*.

Perhaps you will aſk, If there are 7 whole notes, and a ½ note between every two, why does not the ſcale conſiſt of 13 half-notes? 'Tis a natural queſtion: but the reaſon why there are only 5 half-notes, is, that in this natural ſcale, there are two places which require no half-note, becauſe they are only ½ a note aſunder.

Sing 8 ſucceſſive notes, from the loweſt to the higheſt, or from the higheſt to the loweſt, and you will, without knowing it, make but ½ a note in two different places: namely, between the *third* and *fourth*, the *ſeventh* and *eighth*: thus, 1.2.34.5.6.78 *This is named the* SHARP KEY, *or* MAJOR KEY.

Theſe half-notes are not confined abſolutely to the places where you ſee them in the foregoing example: the ear will bear them in the following poſition: 1.23.4.56.7.8 *This is termed the* FLAT KEY, *or* MINOR KEY.

Above, you ſee the ½ notes lie between the *ſecond* and *third*, the *fifth* and *ſixth*. Dot theſe notes on the

the harpſichord, beginning at A; touching none of the ſhort keys, and you will find, that the ear will not only bear it, but that there is a ſweetneſs in the effect, when contraſted with the firſt manner. I ſay firſt manner; for both are the ſame Diatonic Scale*, conſiſting of the ſame number of half-notes.

Let the key-note be what it may, the keys are always known by the *third* being *ſharp* or *flat*: that is, by the ½ tone lying between the *third* and *fourth* note, or between the *ſecond* and *third* note.

Obſerve, that any of theſe notes, or ½ notes on the harpſichord, may be made the firſt note of the ſcale, in either manner; which firſt note gives name to the key in which the piece is modulated, and with which the piece muſt be concluded. Whatſoever note you make the key-note, the ½ notes muſt fall in their proper places: and this is not very difficult, as the inſtrument conſiſts entirely of ½ notes.

Before you try the experiment, it is neceſſary you ſhould know, that every ½ note takes occaſionally either the name of the note above it, or of

* It is named the *Diatonic* Scale, to diſtinguiſh it from the *Chromatic* Scale, which aſcends and deſcends by half-notes. The firſt of theſe modes is the *Major Key*; the ſecond, the *Minor Key*; there are no more than *two Keys*.

that

that below it: thus the $\frac{1}{2}$ note between G and A is G *ſharp*; that is, $\frac{1}{2}$ a tone higher than the natural G, or it is A *flat*, that is, $\frac{1}{2}$ a tone lower than the natural A.

If you begin with C, and proceed upward note by note, you will find the $\frac{1}{2}$ notes lie in their proper places; namely, between the *third* and *fourth*, and between the *ſeventh* and *eighth*, without the neceſſity of introducing any of the ſhort keys.

If you make D your firſt note, in order to make two half-tones according to the *major key*, you muſt take in F ſharp; and, when you come up to C, you muſt take in the C ſharp: becauſe, there muſt be a whole tone between the *ſixth* and *ſeventh*, and but $\frac{1}{2}$ a tone between the *ſeventh* and *eighth*. For the above reaſons, when a piece of muſic is compoſed in ♭ with a m*ajor third*, there is this mark prefixed, ♯ on or between the lines where G and F are pricked: ſignifying that theſe two notes are ſharp.

If you make B *flat* your fundamental note, and proceed upward in the *major key*, you will find yourſelf obliged to take in *E flat*; ſo that B and E muſt be marked flat; thus, D, at the beginning of the movement: nevertheleſs this movement has a ſharp third, and is conſequently in the *major key:*

but if with the ſame firſt note you change the $\frac{1}{2}$ notes according to the *minor* manner, then, A, B, D, E and G will be *flat*.

Cliffs.

MUSICAL notes are made on, or between 5 principal lines; to which there are occaſionally added 1 or 2 more.

To avoid the inconveniency of adding too many of theſe occaſional lines, cliffs were invented; by which any particular line, or interval may be made the place of any note on the ſcale.

If I make the place of G the loweſt line but one, as in the common *triple cliff*, then the note in the interval above, will be A; and that in the interval below will be F, and ſo of the reſt.

If I make the upper line but one, F, as in the *baſs cliff*, then the interval above will be G, and the interval below will be E, &c.

Time.

IN muſic there are but two diſtinctions of time: namely, *common time* and *triple time*.

A bar is the ſpace between any two of the perpendicular lines, drawn acroſs the five ruled lines.

In *common time*, when the notes in a bar are of equal length, the number is even.

In *triple time*, when the notes in a bar are of equal length, the number is odd.

Suppoſe the following figures to be notes; 1234, 1234, 1234, &c. If you ſing theſe four figures to any tune you pleaſe, and beat with your hand, whenever you come to the 1, you will ſing in *common time*. If you change your melody to *three* figures; thus, 123, 123, 123, &c. and beat as before, you ſing in *triple time*.

As to the length of each kind of note, you may name the

Open circle	o	a note.
When it has a tail		a $\frac{1}{2}$ note.
When the head is filled		a $\frac{1}{4}$ note.
When the tails are once tied		an $\frac{1}{8}$th.
When twice tied		a $\frac{1}{16}$th. &c.

Thus, the name expreſſes the relative proportion of every note.

Musical Harmony.

MUSICAL harmony depends on a coincidence in the vibrations of the ſounding bodies.

No two ſtrings can vibrate in equal times unleſs they be tuned in exact *uniſon*; and *uniſon* is the only perfect concord. Other chords are more or leſs perfect, as their vibrations coincide more or leſs frequently.

The next chord in degree of harmony is the *Octave*, becauſe, as it vibrates in half the time, the tones coincide at every *ſecond* vibration.

If a muſical ſtring of any length, be divided by a bridge into two equal parts, each half will ſound an OCTAVE higher than the tone of the whole ſtring.

If the bridge is removed, ſo as to leave 3 parts of the whole ſtring on one ſide, and two on the other, the longer part will ſound a FIFTH to the open ſtring: and if they are ſounded together, there would be a perfect coincidence at every *third* vibration. The FIFTH, therefore, is the next in rank.

Move

Move the bridge, ſo that there ſhall be $\frac{3}{4}$ on one ſide: and the longer part will ſound a FOURTH to the whole ſtring, and their vibrations will unite at every *fourth* return.

Again: move the bridge, ſo as to leave $\frac{4}{5}$ on one ſide: the longer diviſion will ſound a MAJOR THIRD to the open ſtring, and the vibrations of two ſtrings in this proportion, will coincide at every *fifth* repetition.

DISCORDS are the tones where vibrations never coincide: they are, nevertheleſs, of indiſpenſable uſe in muſic as a foil; and as the means of introducing the concord to advantage.

A Sketch of

ANATOMY.

Search through the whole compaſs of external nature, and overlook not the far more ſurpriſing curioſities, which abound in the compoſition of your own body.

HERVEY.

Some anatomical Terms explained.

FIBRES, ſmall animal threads.

TRANSVERSE, lying acroſs.

MEMBRANE, a web.

CARTILAGE, a griſtle.

LUBRICOUS, ſlippery.

FLEXIBLE, pliant.

ELASTIC, having the power of a ſpring.

LARYNX, the entrance of the windpipe.

ARTICULATION, a joining.

LIGAMENT, a binder.

MUSCLES, the inſtruments of voluntary motion.

TENDINOUS, ſinewy.

INTEGUMENTS, coverings.

THORAX, the cheſt.

ABDOMEN, that part of the belly which is between le nombril et les parties honteuſes.

NERVES, the organs of ſenſation.

SPINE, the backbone.

MEDULLARY, marrowy.

VERTEBRÆ, joints of the backbone.

ARTERIES, large blood-veſſels.

SPIRAL, winding upward.

PULSATION, a driving forward.

VENTRICLE, a cavity.

AORTA, the great artery.

DILATATION, width.

VEINS, blood veſſels.

CAPILLARY, ſmall, like hair.

REFLUENT, returning.

VENA CAVA, the largeſt vein.

VENA PORTÆ*, the gate vein.

* The *Vena Portæ* enters the liver through two eminences, named, *Portæ*, the gates.

VENA PULMONARIS, the vein of the lungs.

AURICLES, two caps, like ears, covering two ventricles of the heart.

CORONARY ARTERIES, thoſe which ſurround the heart to nouriſh it.

VISCERA, the bowels.

LYMPH, a clear fluid.

LACTEAL VESSELS, are ſo called becauſe they contain a milky fluid.

BRAIN, all the ſoft ſubſtance contained within the ſkull.

LUNGS, (i. e. empty, being filled with nothing but wind), the lights.

HEART, the ſource of vital motion.

STOMACH, a cavity in which the food is digeſted.

LIVER, one of the entrails—poſſibly ſo called, becauſe it was eſteemed the fountain of life.

SPLEEN, the milt; a bowel under the left ſhort ribs: the uſe of which is ſcarcely known.

PANCREAS (i. e. all fleſh), the ſweet-bread.

KIDNEYS, the chief organs of urinary ſecretion.

GLANDS, flesh kernels, whose use is to secrete fluids from the mass of blood for divers purposes.

INTESTINES, the bowels.

DURA MATER, the outside skin which encompasses the brain.

CEREBRUM, the forepart of the brain.

CEREBELLUM, the back part of the brain.

CRANIUM, the skull.

LOBE, any roundish body.

TRACHEA*, the windpipe, extending from the mouth to the lungs.

DIAPHRAM, or MIDRIFF, a membrane which separates the heart and lungs from the lower belly.

VALVE, a falling door.

PYLORUS, the lower orifice that lets the meat out of the stomach into the intestines.

CARDIA, the pit of the stomach.

ŒSOPHAGUS, the gullet; that membranous canal which conveys the aliment from the mouth to the stomach.

* The entrance of the *Trachea* is named the *Larynx*: the rest, *Aspera Arteria*.

DUODENUM, is the firſt of the three ſmall bowels; ſo called from it's length, being about 12 fingers' breadth.

RUGÆ, wrinkles.

CHYLE, a white fluid.

HYPOCHONDRIUM, the region under the cartilages of the lower ribs.

UMBILICAL VESSELS, are the veins, arteries, &c. which are enwrapped in the boyau du nombril.

BILE, gall.

VESICULA FELLIS, the gall bladder.

PORUS BILIARIUS, a duct which paſſes directly from the liver to the *Choledochus*, or common duct.

DUCTUS CYSTICUS, is a duct which goes from the neck of the Veſicula Fellis to that part where the Porus Biliarius joins it.

ATTENUATED, thinned.

PANCREATIC JUICE, a fluid, ſeparated by the glandulous ſubſtance of the pancreas, to dilute the chyle for the lacteal veſſels.

CONGLOMERATE, wound round together; thus, a *conglomerate gland*, is one which ſeems to be made of ſmaller glands, and is uneven on it's ſurface.

COLON, le gros boyau.

URETERS, tubes that convey the urine from the kidneys to the bladder.

SALIVA, ſpittle.

VERMICULAR, like a worm.

FÆCES, excrements.

JEJUNUM, the ſecond ſmall bowel; ſo termed from it's being uſually found empty.

MESENTERY, a thick ſkin, enveloping the bowels.

THORACIC, relating to the breaſt.

SUBCLARIAN VEIN, a vein under the clavicle, or collar-bone.

SERUM, the watery part of the blood.

REINS, the kidneys.

ANATOMY

Is the accurate diſſection of a human body, in order to diſcover it's ſtructure and uſes.

The human body conſiſts of ſolid and fluid parts. The SOLID PARTS are the

Bones,	Membranes,
Cartilages,	Nerves,
Ligaments,	Arteries,
Muscles,	Veins,
Tendons,	Ducts.

A BONE is a bundle of hard fibres, tied to each other by ſmall tranſverſe fibres. The bones are hard, brittle and inſenſible; but covered on their inſide and outſide with an exquiſitely ſenſible membrane, named *perioſteum*, except on the ſkull, where the membrane is named *pericranium*. The bones contain marrow.

There are different ſorts of bones in the human body:

Some are hollow——others ſolid;
Some are ſmall——others large;
Some round——others flat;
Some plane——others convex or concave.

In

In the human body, are 247 bones ; namely,

In the head - - - -	67
In the trunk - - - -	56
In the upper extremities -	64
In the lower extremities -	60

Though I have ſaid that there are 247 bones in the human body, yet the number is various in various ſubjects; ſome ſay 300 or 307; others, 318; but late writers fix it at moſt to 250, and commonly to 247, as above.

A CARTILAGE approaches to the nature of a bone, but is ſmooth, lubricous, flexible and elaſtic; having no cavities containing marrow, nor any membrane to make it ſenſible.

The uſe of the cartilages is to cover the ends of the bones that have motion, to prevent them from being damaged by a continual friction; and to contribute, in a great meaſure, to the formation of ſeveral parts; as the larynx, noſe, ears, &c.

LIGAMENTS are white, fibrous, compact ſubſtances, more flexible than cartilages, not eaſily torn, and

and yield but very little when pulled. They form either narrow cords, broad bands, or thin webs. It is generally agreed, that the ligaments are nearly insensible in their natural state, but are capable of very acute pains when diseased: their chief use is to fasten the bones in their articulation.

MUSCLES are distinct portions of flesh, soft and red, compounded of fibres, tendons, nerves, veins, and arteries, all inclosed in a peculiar membrane. The fleshy fibres compose the belly of the muscle, and the tendinous fibres compose the extremities of the muscle. The use of the muscles is to promote voluntary and involuntary motion.

The larger muscles, particularly in the extremities, have substances joined either to one or both ends of them, which substances are termed TENDON; which is less than the muscle itself. The tendon is whitish, firm, hard and tougher than the muscle; and is elastic; for by pulling it breaks. The tendon is not red, from having fewer vessels than the other part of the muscle to which it belongs, as in the white of the eye, but, like that, it becomes red either by injection or inflammation. Dr. Hunter thinks that the fibres of a tendon are only as cords fixed to the ends of the muscles, which are the agents;

agents; for no one imputes any action to the tendons. The uſe of tendons is the ſame as that of muſcles.

Membranes are a pliable texture of fibres interwoven together, and expanded, to cover or line any other part. Every diſtinct part of the body is covered, and every cavity is lined with a ſingle membrane, whoſe thickneſs and ſtrength is as the bulk of the part to which it belongs, and as the friction to which it is expoſed. The membranes of the body are various and variouſly denominated; thoſe which ſerve as integuments, are named *tunics*; thoſe that cover the brain, *meninges*; the ſkull, *pericranium*; the bones in general, *perioſteum*; that which lines the thorax, *pleura*; the abdomen, *peritonæum*; and that which includes the heart, *pericardium*. The muſcles, too, are each incloſed in a peculiar membrane; as are the bowels, &c. The uſes of the membranes are to cover and wrap up the parts, ſtrengthen them, and ſave them from external injuries.

A Nerve is a ſmall, but long bundle of very fine hollow pipes, wrapped up in the membranes of the brain from whence theſe pipes have their beginning.

The

The nerves are the organs of all ſenſation: for the eye, the ear, the noſe, the tongue, has one pair or more of theſe nerves from the brain.

The nerves from the ſpinal marrow are ſpread through all parts of the muſcles and their membranes, and to every point in the ſuperficies of the body; thereby making the whole ſenſible. It is ſuppoſed that the nerves render the parts ſenſible by the motion of an exceedingly fine, inviſible fluid, named the *animal ſpirits*; by which, impreſſions are communicated to the mind, ſeated in the brain, from all parts of the animal body. The nerves come forth by pairs, and the human body has forty pair. *Ten pair* proceed from the medullary ſubſtance of the brain, and are chiefly diſtributed to the head and neck. *Thirty pair* from the ſpinal marrow, proceed through the *Vertebræ*, to all the other parts of the body.

ARTERIES are thoſe pipes, which convey the blood from the heart to all parts of the body.

The arteries branch out into various ramifications, and become inviſible at laſt.

An artery is compoſed of three coats; the external and internal are membranous; but the middle coat

coat is rather muſcular; conſiſting of ſpiral fibres, which make it elaſtic, and is the cauſe of pulſation which is a motion of the arteries only.

The blood being thrown out ſome and ſome at a time from the left *ventricle* of the heart into the *aorta*, preſſes the ſides of the artery, and cauſes an intermitting dilatation thereof; this dilatation is continued by the conſtant pulſive motion of the blood, and the elaſticity of the artery acting on it. Hence the alternate dilatation and contraction of the coats of the artery, is what we name the pulſe.

Veins are only a continuation of the extreme capillary arteries; they convey the refluent blood to the heart. The veins, in their return, unite their channels as they approach the heart; and form at laſt three large veins; namely, the *Vena Cava*; *Vena Portæ*; and *Venæ Pulmonares*.

The *Vena Cava* carries back to the right auricle of the heart the blood conveyed by the aorta to all the parts of the body, except what goes by the coronary arteries of the heart.

The *Vena Portæ* receives the blood carried to the *viſcera* of the abdomen, and conveys it to the vena cava.

The *Venæ Pulmonares* convey to the left auricle of the heart, the blood carried to the lungs by the pulmonary artery.

The external veins have frequent communications with the internal, and are always fulleſt when we uſe moſt exerciſe. The veins have no pulſe, becauſe the blood is poured into them in a continued ſtream; and becauſe it moves from a narrow channel to a wider.

The ABSORBENTS are fine veſſels, diſperſed through all parts of the body, and convey either poiſons or nouriſhment into the circulation.

Of the before-mentioned ſimple ſolids, conſiſt the compound organs of life: namely, the

BRAIN,	SPLEEN,
LUNGS,	PANCREAS,
HEART,	KIDNEYS,
STOMACH,	GLANDS,
LIVER,	INTESTINES.

The BRAIN is a ſoft white maſs, where all the organs of ſenſe originate, and in which the ſoul is ſuppoſed

ſuppoſed to reſide. It is contained within the *dura-mater*, and divided into the *cerebrum* and *cerebellum*, both in the *cranium*. The human brain is three times as much in quantity as the brain of an ox; it being in general about four pounds weight.

The LUNGS are divided into two large lobes; the right and the left. The ſubſtance of the lungs is ſpongeous, and ſeems compoſed of an infinite number of lobules of various figures and magnitudes. Theſe are diſpoſed like ſo many bunches of grapes on the ſides of the branches of the *trachea*. When the lungs are inflated, they have ſome reſemblance to the hoof of an ox; convex on the ſide next the ribs, and concave next the diaphragm.

The HEART is a muſcular body, included in the pericardium, and ſituated in the cavity of the thorax, nearly in the middle of the breaſt. The heart is the primary organ of the circulation of the blood, and conſequently of life. It is, in ſome meaſure, of a conical figure, flatted on the ſides, round at the top, and oval at the baſis. It's ſituation is nearly horizontal. The pulſe is occaſioned thus: the fibres of the heart gradually growing ſhorter, diminiſh it's length, and increaſe it's breadth; they ſtreighten

the cavities of the ventricles, dilate the tendinous mouths of the arteries, determine the valves of the mouths of the veins for the ſtoppage of their contents, and drive with great force it's contained blood into the dilated mouths of the arteries, in order to it's circulation through the body.

The heart has two motions, called the *ſyſtole* and *diaſtole*.

The *ſyſtole* motion is when the heart contracts, and ſtreightens it's cavities.

The *diaſtole*, is when it dilates, and it's cavities become wide.

The heart has two *ventricles*; the right and the left; and above each ventricle is an *auricle*. The vena cava opens into the right auricle; and the venæ pulmonares open into the left auricle.

It is computed, that each ventricle of the heart holds five ounces of blood (and each is filled and emptied every ſyſtole and diaſtole); and that there are commonly 80 pulſes in a minute; if ſo, there flows 25 pounds of blood through each ventricle of the heart in a minute. Dr. Keill has ſhown, that the ſum of all the fluids in a man, exceeds the ſum of all the ſolids; and yet the quantity of blood which all the viſible arteries of a man will contain, is leſs than four pounds.

The

The pulmonary artery arifes from the right ventricle of the heart. The aorta arifes from the left ventricle of the heart.

When the right auricle dilates, the blood rufhes in from the vena cava. When the right auricle contracts, the blood is thruft into the right ventricle; thence it is driven into the pulmonary artery, by which it is circulated through all the parts of the lungs; and then (being by refpiration prepared, reduced, mixed and impregnated by the vital fpirit of the air), returned by the pulmonary vein into the left auricle, and from thence into the left ventricle, which, in it's contraction, forces it into the aorta, this carries it to all parts of the body; from whence it is returned by the veins to the right auricle.

Thus, by the fyftole and diaftole of the auricles and ventricles of the heart, the circulation of blood is effected.

The length of the human heart is about 6 fingers' breadth; at the bafe about 5 fingers'; it's circumference about 13 fingers.

The STOMACH is fituated juft under the midriff; and is of a long, wide, and roundifh figure; having

two orifices; the right named the *pylorus*, and the left, the *cardia*.

The cardia joins to the æſophagus, by which the ſtomach receives it's aliments: and the pylorus unites to the duodenum.

The ſtomach is made of four coats; the external coat is common to the whole ſtomach: the ſecond is muſcular; being made of ſtraight and circular fibres: the third coat is fine, thin, and wholly nervous: The fourth and inmoſt coat is full of plaits and rugæ; in which is a great number of glands, that ſeparate a liquor, which, beſmearing the cavity of the ſtomach, helps digeſtion.

By the muſcular action of the ſtomach and fermenting juices, the aliment is diſſolved and reduced to a chyle which is protruded through the pylorus into the inteſtines: and this is termed digeſtion, which is the proper office of the ſtomach.

The LIVER lies in the right *hypochondrium*; is round, glandulous, and pretty thick; convex on the upper ſide, and ſomewhat concave on it's under ſide. It's forepart is divided into two, where the umbilical veſſels enter it. The uſe of the liver is to ſeparate the bile from the blood.

The

The vena portæ brings the blood to the liver full of bile, for it's ſecretion, by the glands of the liver; and the vena cava carries back to the heart the blood which remains.

The pori biliarii going out of the liver, join the ductus cyſticus; and with it form one common duct named the choledochus, which carries the gall to the duodenum, to be mixed with the chyle.

The SPLEEN is of a deep blackiſh red colour, ſituated on the left ſide of the ſtomach, immediately under the diaphragm, near the ribs, and above the left kidney. It is of an oblong figure. The uſe of the ſpleen has been much controverted by authors; but is generally conceived to be an aſſiſtant organ to digeſtion.

PANCREAS is a large gland of the conglomerate ſort. It lies acroſs the abdomen, and reaches fro the liver to the ſpleen. The glandulous ſubſtance of the pancreas ſeparates a fluid, called the pancreatic juice, which is conveyed by a duct to the duodenum, to dilute the chyle, that it may more eaſily enter the mouths of the lacteal veſſels.

The KIDNEYS are of an oblong figure, each resembling in shape a French bean. The right kidney lies under the liver; the left under the spleen; the concave side is turned inward to the vertebræ; and the convex side outward. The kidneys are connected with the loins, the lower ribs, and the ureters. The use of the kidneys is to secrete the urine from the blood, which is brought there for that purpose by the emulgent arteries; and what remains from the secretion, is returned by the emulgent veins, while the urine secreted is carried off through the ureters to the bladder.

GLANDS are small bodies, formed by the interweaving of vessels of every kind, covered with a membrane; generally composed of an artery. The glands are of two kinds; namely the simple, called conglomate; and the compound, named conglomerate; the glands differ very considerably in colour, size and figure. Their use is secretion of humours from the blood: thus the glands of the brain secrete the animal spirits; those of the mouth secrete the saliva; those of the breasts, milk; those of the liver, bile; and those of the skin, the insensible matter of perspiration.

The INTESTINES are long tubes, which by ſeveral turnings, reach from the pylorus of the ſtomach to the anus: they are connected with the edge of a membrane, named the meſentery; and are ſix times the length of the body to which they pertain. Their uſe is, by a peculiar vermicular motion of their ſpiral fibred coats, to convey along, and extrude the fœces, after the chyle is ſtrained from them.

The FLUID PARTS, are

The Chyle,	Pancreatic Juice,
Blood,	Urine,
Saliva,	Phlegm,
Bile,	Serum,
Milk,	Aqueous humour of the eyes.
Lymph,	

CHYLE is a milky fluid, into which the food is converted by the *concoction* and *digeſtion* of the ſtomach; the *chyle* paſſing by the pylorus out of the ſtomach into the firſt of the inteſtines, named the *duodenum*, in it and the next, termed the *jejunum*, it mixes with the bile and pancreatic juice; by which means the chyle undergoes a further preparation;

ration; the more alimentary part being hereby refined and ſeparated, is received into the numerous orifices of the firſt lacteal veins, opening into the ſaid inteſtines; by theſe it is conveyed to, and ſtrained through, the glands of the meſentery; whence it is received by a ſecond ſort of lacteal veins, and carried to the baſon, called the *receptaculum chyli*; where being duly impregnated with the lymph from the *lymphæducts* there poured into it, it is thence carried upward by the thoracic duct, and emptied into the left *ſubclavian vein*, where it is mixed with the refluent venal blood, deſcends into the right ventricle of the heart, is thence circulated through the lungs into the left ventricle, and from thence through all the parts of the body: and this is the *animal œconomy*, or ordinary method by which the *blood is removed* and *life continued*.

BLOOD is a vital ſtream, proceeding from the fountain of the heart, and circulating conſtantly through the whole body by the canals of the arteries and veins. If it be viewed with a microſcope, it appears to conſiſt of ſmall red globules, ſwimming in a thin tranſparent ſerum; and that each globule is made up of ſix ſmaller ones. *Dr. Boerhaave* ſays, that the mixture, fluidity, heat, and redneſs of the blood, are owing to, and preſerved by, the circulatory motion thereof.

The

The other fluids are all ſeparated from the blood in ſome part of the body or other, by the glands: thus,

The SALIVA is ſecerned by glands behind the ears, and the glands of the mouth.

The BILE, you know is ſeparated by the liver.

The MILK is ſtrained off from the blood by the glands of the breaſts.

The LYMPH is a fermenting juice, ſecerned by the ſmall conglobate glands, in ſeveral parts.

The PANCREATIC JUICE is a ſweet lymphid fluid, to dilute and refine the chyle.

The URINE is ſecerned by the kidneys.

PHLEGM is a mucous matter, ſeparated by the glands of the mouth, noſe, &c.

SERUM is the aqueous part of the blood, which is not diſcerned from the blood itſelf in the body; but taken out, it ſeparates from the coagulated blood, by the diminution of it's heat.

The

The AQUEOUS HUMOUR OF THE EYE is ſe cerned from the arterial blood in the veſſels of the eye.

Dr. Keill ſays that

HAIRS, examined with a microſcope, are found to have each a round bulbous root, lying pretty deep in the ſkin, which draws it's nouriſhment from the ſurrounding humours; that each hair conſiſts of five or ſix others, wrapped up in a common tube: they grow as the nails do, each part near the root, thruſting forward that which is immediately above it; and not by any liquor running along the hair, in tubes, as plants grow. Their different colours depend on the different quality and temperament of the humours producing them.

NAILS are of the ſame nature as the hoofs of beaſts; and are nothing but the covers of the ſkin on the extremities of the fingers and toes, which dry, harden, and lie cloſe upon one another.

Bones in the Human Body.

IN THE HEAD ARE SIXTY SEVEN BONES.

In the skull - -	8
In the face and upper saw	13
In the lower saw -	1
The teeth -	32
The bones of the tongue	5
And Those of the internal ear	8
	67

IN THE TRUNK ARE FIFTY SIX BONES.

The spine has - -	26
The thorax - -	27
The pubes - -	3
	56

IN THE UPPER EXTREMITIES ARE SIXTY FOUR.

The shoulders have	4
The arms - -	2
The fore-arms -	4
The hands -	54
	64

IN THE LOWER EXTREMITIES ARE SIXTY.

In the thighs -	2
In the legs -	6
In the feet - -	52
	60

Names of the principal Bones.

The Os FRONTIS, the forehead.

The Os OCCIPITIS, the back part of the ſkull.

OSSA MALARUM, the cheek bones.

The OSSA NASI, the upper part of the noſe.

MAXILLA SUPERIOR, the upper jaw.

MAXILLA INFERIOR, the lower jaw.

The OSSA PALATI, the roof of the mouth.

DENTES, the teeth; adults, if perfect, have 32; ſixteen in each jaw.

The SPINE has 24 vertebræ; namely,

The neck	7
The back	12 and
The loins	5.

STERNUM, the breaſt bone.

COSTÆ, the ribs, of which there are 24; twelve on each ſide. The true ribs are the 7 higher pair: the ſhort ribs are the 5 lower pair.

CLAVICULA, the collar-bone.

SCAPULA, the ſhoulder-blade.

Os Humeri, the large bone of the arm.

The Radius is the larger bone of the fore-arm, or *cubit*.

Ulna, the ſmaller bone of the cubit.

Carpus, the wriſt.

The Metacarpus is that part between the wriſt and the fingers.

Pollex, the thumb.

Index, the fore-finger.

Digitus Medius, the middle-finger.

Digitus Annularis, the ring-finger.

Digitus Minimus, the little-finger.

Os Femoris, the thigh-bone; the longeſt and ſtrongeſt of the whole human frame.

Patella, the knee-pan.

Tibia, the large bone of the leg.

Fibula, the ſmall bone of the leg.

The Tarsus is the ſpace between the bones of the leg and the

Metatarsus, which is the ſpace between the tarſus and the toes.

Digiti Pedis, the toes.

Letters to a Pupil,

ON ANATOMY.

My dear George,

WHEN a maſter-builder undertakes to erect a magnificent edifice, he begins with the leſs decorated, but more ſolid parts; thoſe which are to *ſupport*; or thoſe which are to *contain* the reſt.

This order I will follow, in conſidering the elegant edifice of the human body; an outline of which I am about to delineate for your amuſement and information. It has been ſaid, by GALEN, that, To acquaint ourſelves with the ſublime perfections of the DEITY; and to point out to others his infinite power, his unerring wiſdom, and his boundleſs benignity, is a more ſubſtantial act of devotion, than to ſlay hecatombs of victims at his altar, or to kindle mountains of ſpices into incenſe.

This is my opinion; I have always conſidered it a

Delightful taſk! to rear the tender thought,
To teach the young idea how to ſhoot,
To pour the freſh inſtruction o'er the mind,
To breath th' enlivening ſpirit, and to fix
The generous purpoſe in the glowing breaſt.

But I wander from the ſubject. You have a ſyſtem of *bones*, caſt into a variety of moulds, enlarged and contracted into a variety of ſizes. All *ſtrong*, that they may commodiouſly bear up the fleſhy machine: yet *light*, that they may not depreſs you with an encumbered load. *Bored* with an internal cavity, to contain the moiſtening marrow; and *perforated* with exceedingly fine ducts, to admit the nouriſhing veſſels. Inſenſible themſelves, they are *covered* with a membrane of exquiſite ſenſibility, which warns them of the approach, and ſecures them from the annoyance of any injurious friction; and, at the ſame time, preſerves the muſcular parts from being fretted in their action, by the hard and rough ſubſtance of the bones. Their *figures* are always preciſely fitted to their uſes. They are generally larger at the extremities than in the middle, that they may be joined more firmly, and not ſo eaſily diſlocated. The manner of their *articulation* is truly admirable, and remarkably various; yet never varied, without demonſtrating ſome wiſe deſign, and anſwering ſome valuable end. Frequently when two are united, the one is nicely rounded, and capped with a ſmooth ſubſtance; the other is ſcooped into a hollow of the ſame dimenſions, to receive the poliſhed knob; and both are lubricated with an unctious fluid, to yield the readieſt rotation in the ſocket.

The *feet* compoſe the firmeſt and neateſt pedeſtal; infinitely beyond all that ſtatuary or architecture can accompliſh; capable of altering it's form, and extending it's ſize, as different circumſtances require. Beſides performing the office of a pedeſtal, they contain a ſet of the niceſt ſprings; which help to place the body in a variety of graceful attitudes, and qualify it for a multiplicity of advantageous motions. The undermoſt part of the heel, and the extremity of the ſole, are ſhod with a tough, inſenſible, ſinewy ſubſtance. This we call a kind of *natural ſandal.* It never wears out, never wants repair, and always prevents that undue compreſſion of the veſſels, which the weight of the body, in walking or ſtanding, might otherwiſe occaſion. The *legs* and *thighs* are like ſubſtantial and ſtately columns; articulated in ſuch a manner, that they adminiſter commodiouſly to the act of walking, yet obſtruct not the eaſy poſture of ſitting. The legs ſwell out, toward the top, with a genteel projection; and are wrought off toward the bottom, with neat diminutions; which variation leſſons their bulk, at the ſame time that it encreaſes their beauty.

The *ribs*, turned into a regular arch, are gently moveable, for the act of reſpiration. They form a ſecure lodgement for the lungs and the heart; which being ſome of the moſt diſtinguiſhed and important organs of life, have their reſidence fortified by this ſtrong ſemicircular *rampart.* The *backbone*

is

is intended, not only to ſtrengthen the body, and ſuſtain it's moſt capacious ſtorerooms; but alſo to bring down that communication of the brain, which is uſually termed the *ſpinal marrow*. As an open channel, it conveys; as a well-cloſed caſe, it guards the vital ſilver; and, by ſeveral commodious outlets, tranſmits the animating treaſure into all the inferior parts. Had it been only large, ſtraight and hollow, it might have ſerved theſe ſeveral purpoſes. But then the loins muſt have been inflexible, and every man impaled, by nature, on a ſtake coeval with his exiſtence. To avoid which, it conſiſts of very ſhort bones, cloſely knit together by intervening cartilages. This peculiarity of ſtructure prevents diſlocation; and gives the main pillar of our frame the *pliancy* of an *oſier*, even while it retains the *firmneſs* of an oak. By this mean, it is a kind of continued joint; capable of various inflections, without bruiſing the ſoft medullary ſubſtance, which fills it's cavity, without intercepting the nervous fluid, which is to be detached from this grand reſervoir; or diminiſhing that ſtrength, which is neceſſary to ſupport all the upper ſtories. A formation ſo very peculiar in any other of the ſolids, muſt have been attended by great inconveniencies. Here it is unſpeakably ſerviceable: and for workmanſhip and ſituation, is a maſter-piece of creating ſkill, never enough to be admired.

Dear George,

My former letter ſpeaks of the *bones*, the *feet*, the *legs*, and the *ribs*; here, I ſhall notice the *arms*, which, pendent on either ſide, are exactly proportioned to each other, that the equilibrium of the ſtructure may not be diſconcerted. Theſe, being the guards which defend, and the miniſters which ſerve the whole body, are fitted for the moſt *diverſified* and *extenſive* operations; firm with bone, yet not weighty with fleſh, and capable of performing, with ſingular expedition and eaſe, all manner of uſeful motions. They bend inward and turn outward, they riſe upward and ſtoop downward; they wheel about, and throw themſelves into whatever direction we pleaſe. To theſe are annexed the *hands*; and all terminated by the *fingers*: which are not like the arms, of the ſame length, and of an equal bigneſs, but in both reſpects different: which gives them a more graceful appearance, and a much greater degree of uſefulneſs. Were they all fleſh, they would be *comparatively* impotent; were they one entire bone, they would be *utterly* inflexible: but conſiſting of various little bones, and a multitude of muſcles, what ſhape can they not aſſume? what ſervice can they not perform?—Being placed at the end of the arm, the ſphere of their action is exceedingly

exceedingly enlarged, and one pair of hands is as ſerviceable as an hundred. The extremities of the fingers are an aſſemblage of fine tendinous fibres, moſt acutely ſenſible: which, notwithſtanding the delicacy of their texture, are deſtined to almoſt inceſſant employ, and frequently exerciſed among rugged objects. For this reaſon, they are overlaid with the *nails*, a ſort of horny expanſion; which, like a ferule, hinders the fleſh from being ungracefully flattened; and, like a ſheath, preſerves the tender parts from injurious impreſſions. In the miniſtry of the hands, and activity of the fingers, we poſſeſs a caſe of the *fineſt inſtruments*,—a collection of the *nobleſt utenſils*; qualifying us for the execution of every work, which the projecting genius can deviſe, or the laviſh fancy crave. To theſe we are obliged for the beautiful ſtatues, which have often entertained us; and even for that melodious trumpet, which now addreſſes my ears. Theſe raiſe the lofty column, and turn the ſpacious arch. Theſe ſwell the majeſtic dome, and adjuſt the commodious apartment. Architecture's ſtriking beauties and rich benefits are the creation of the human hand. Yielding to it's ſtrength, the talleſt firs fall to the ground, and the largeſt oaks deſcend from the mountains. Faſhioned by the dexterity of the hand, they accommodate the ſailor with a *floating warehouſe*; and circulate, from *Britain* to *Japan*, the productions of nature, and the improvements of

art.—Obedient to the human hand, metals aſcend from their ſubterranean beds, and compoſe the moſt ſubſtantial parts of that *curious machine**, which tranſmits far and near, to the monarch's palace, and to the peaſant's hut, ſuch treaſures of wiſdom, as *gold and chryſtal cannot equal.* Among the *Egyptians*, the *hand* was the ſymbol of ſtrength; among the *Romans*, it was an emblem of fidelity; and I think it may, among all nations, be looked upon as the enſign of *authority*. It is the original and the univerſal ſceptre; that which not only repreſents, but aſcertains our dominion over all the elements, and over every creature. Though Providence has not given us the ſtrength of the horſe, the ſwiftneſs of the greyhound, or the ſagacious ſcent of the ſpaniel; yet, directed by the underſtanding, and enabled by the hand, we can ſubject them to our will; turn them to our advantage; and, in this ſenſe, make them all *our own*. Theſe hands, theſe *ſhort* hands have found out a way, whereby they can dive to the bottom of the ocean; can penetrate the bowels of the earth; and reach from ſhore to ſhore. Theſe *feeble* hands can manage the wings of the wind, can arm themſelves with the rage of fire, and preſs into their ſervice the forcible impetuoſity of the waters. How eminent is the dignity! how extenſive the agency of the hand! It would require more eloquence,

* The printing preſs.

than

than the moſt famous orator poſſeſſes, to diſplay the former; and more pages, than this book contains, to deſcribe the latter.—How greatly, then, are we indebted to our indulgent CREATOR, for accommodating us with this noble, diſtinguiſhing, and invaluable member. This is a long letter, my dear boy, but I truſt you will not think it *too* long.

Adieu.

As I find, my dear George, that you receive pleaſure in reading my letters—I ſhall continue the ſubject without further preface.

The *head* is above all; a majeſtic dome, deſigned for the reſidence of the brain. It is framed in exact conformity to this important purpoſe; ample, to receive it; ſtrong, to uphold it; and firm to defend it. As the head reſembles the *general's* tent in an army, or the *monarch's* palace in a city; it has a communication with all, even the moſt inferior and remote parts of the ſyſtem; has out-lets and avenues for the ready diſpatch of couriers to all quarters; and for the reception of ſpeedy intelligence, on every intereſting occaſion. It is furniſhed with lodgements, wherein to poſt centinels of various

characters, and appointed for various offices. To expedite their operations, whether they are employed in reconnoitering what passes *without*, or examining what claims admittance *within*; the whole turns upon a curious pivot most nicely contrived, to afford the largest, and freest circumvolutions.

This stately capital is screened from heat, defended from cold, and, at the same time, very much beautified by a curious growth of *hair*; which flows from the parted forelock in curls, and hangs, mantling on the cheeks, clustering on the shoulders.—A decoration incomparably more *delicate* than all the orders of architecture can supply, and so perfectly light that it no way encumbers or incommodes the wearer.

While many animals creep on the ground, while all of them are prone in their posture or their aspect, the attitude of man is *erect*.—Which is by far the most *graceful*, has an air of dignity, and bespeaks superiority. It is by far the most *commodious*; fits us for the prosecution of every grand scheme, and facilitates the success of all our extensive designs. It is likewise attended with the greatest *safety*; being, if not less than any other position exposed to dangers, yet more happily contrived to repel or avoid them.

The

The *bones*, to carry on the allusion, are only the *rafters*, the *beams*, the *shell* of the living edifice. I have raised the walls, and laid the floors; I have made the proper divisions, and left the necessary apertures. But, in every finished house, the roof is covered, and the rooms are wainscotted. The sashes are hung, and the doors turn upon their hinges. The grates are fixed, and the stairs ascend. *Within*, the lodgings are furnished; *without*, the front is ornamented. All is rendered commodious for domestic use, and graceful to the external view. This likewise is executed by the great, the divine ARTIFICER. Here are *ligaments*; a tough and strong arrangement of fibres, to unite the several limbs, and render what would otherwise be a disjointed, unwieldly jumble, a well-compacted and self-manageable system. Here are *membranes*; or thin, flexile tunicles, appointed to enwrap the fleshy parts; to form a connection between some, and to make a separation between others.

Arteries, the rivers of our little world, or the aquæducts of the organised metropolis. Some of which ascend to the head; others spread themselves over the shoulders; some extend to the arms, some descend to the feet, and striking out, as they go, into numberless smaller canals, visit the streets, the alleys, and every apartment of the vital city.—These, being wide at their origin, and lessening as they branch

branch themſelves, check the rapid impetus of the blood. To ſuſtain this ſhock, they are endued with uncommon ſtrength; by performing this ſervice, they oblige the crimſon current to paſs into the *narroweſt defiles*, and diſtribute itſelf into all quarters. The blood thrown from the heart dilates the arteries, and their own elaſtic force contracts them. By which means, they *vibrate* in proper places very perceivably againſt the finger, bring advices of the utmoſt importance to the phyſician, and very much aſſiſt him, both in diſcovering the nature of diſeaſes, and preſcribing for their reſpective cures.—The larger arteries, wherever the body is formed for incurvation, are ſituate on the *bending* ſide; leſt being ſtretched to an improper length by the inflection, their dimenſions ſhould be leſſened, and the circulating fluid retarded. They are not, like ſeveral of the conſiderable veins, laid ſo near the ſurface, as to be protuſive of the ſkin; but are depoſited to a *proper depth* in the fleſh. This ſituation renders them more ſecure from external injuries. It conceals, likewiſe, thoſe ſtarts of the pulſe, which, if apparent, would diſompoſe the moſt ſedate, and diſfigure the moſt comely countenance. Could we caſt our eye upon the river, which runs through the neighbouring meadow, we might obſerve ſeveral mills interſecting the ſtream. The waters at thoſe places, if not entirely ſtopped, drain away very ſlowly. In conſequence of this obſtruction, the

lower

lower channel would be ſunk dry, and the upper ones ſwelled into a flood. To obviate both theſe inconveniences, *low-ſhots* are provided; which, carrying off the ſurcharge, prevent a glut above, and ſupply the banks below. In thoſe parts of the body, which are moſt liable to preſſure, much the ſame expedient takes place. The arteries *inoſculate*; or breaking into a new tract, they make a little circle, in order to return and communicate again with the main road. So that, if any obſtacle blocks up or ſtraightens the direct paſſage, the current, by diverting to this new channel, eludes the impediment, maintains an uninterrupted flow, and ſoon regains it's wonted courſe.

I remain ſincerely your's.

Dear Pupil,

THE *veins* are appointed to receive the blood from the arteries, and re-convey it to the heart. Small at their riſe, and enlarging as advancing, they are void of pulſation. In theſe, the preſſure of the circulating fluid is not ſo forcible as in the arterial tubes: for which reaſon, their texture is ſlighter. Such an exact *œconomiſt*

is

is nature, even amidſt all her *liberality!* In many of theſe canals, the current, though widening continually, and acquiring a proportionable increaſe of gravity, is obliged to puſh it's way againſt the purpendicular. By which circumſtance it is expoſed to the hazard of falling back, and overloading the veſſels, if not of ſuppreſſing the animal motion. For a ſecurity againſt this danger, *valves* are interpoſed at proper diſtances; which are no hindrance to the regular paſſage, but prevent the reflux, ſuſtain the augmented weight, and facilitate a progreſs to the grand receptacle. This auxiliary contrivance comes in, where the blood is conſtrained to climb: but is diſmiſſed where the ſteep aſcent ceaſes, as ſuch a precaution would be needleſs. Here are *glands*, whoſe office it is to filtrate the paſſing fluid. Each of theſe glands is an aſſemblage of veſſels, complicated, and intervolved, with ſeeming confuſion, but with perfect regularity. As ſome kind of ſieves tranſmit the duſt, and retain the corn; others bolt out the meal, and hold back the bran; ſo ſome of theſe glandulous ſtrainers draw off the fineſt, others the groſſeſt parts of the blood. Some, like the diſtiller's alembic, *ſublimate*; others like the common ſewers, *deſæcate*. Each forms a ſecretion, far more curious than the moſt admired operations of chymiſtry; yet all neceſſary for the ſupport of life, or conducive to the comfort of the animal. Muſcles, woven in

Nature's

Nature's niceſt loom; compoſed of the ſlendereſt fibres, yet endued with incredible ſtrength; faſhioned after a variety of patterns; but all in the higheſt taſte for elegance, conveniency, and uſefulneſs. Theſe with their tendons annexed, conſtitute the inſtruments of motion. The former contracting their ſubſtance, operate ſomewhat like the pulley in mechanics. The latter reſembling the cord, are faſtened to a bone, or ſome partition of fleſh; and following the muſcular contraction, actuate the part into which they are inſerted. This and all their functions they execute, not like a beaſt of burden, but quick as lightning. *Nerves* ſurpriſingly minute tubes, derived from the brain, and permeated by an exquiſitely ſubtle fluid: which gliding into the muſcles, ſets them on work; diffuſes the power of ſenſation through the body; or, returning upon any impreſſion from without, gives all needful intelligence to the ſoul. *Veſicles*, diſtended with an unctuous matter in ſome places, compoſe a ſoft cuſhion for nature; in other places, they fill up their vacuities, and ſmooth the inequalities of the fleſh. Inwardly, they ſupple the ſeveral movements of the active machine; outwardly, they render it's appearance plump, well-proportioned and graceful.

The *ſkin*, like a curious ſurtout, exactly fitted, is ſuperinduced over the whole. Formed of the

moſt

moſt delicate net-work; whoſe meſhes are minute, and whoſe threads are multiplied even to a prodigy. The meſhes ſo minute, that nothing paſſes them, which is diſcernable by the eye; though they diſcharge, every moment, myriads and myriads of ſuperfluous incumbrances from the body. The ſteam, ariſing from the warm buſineſs tranſacted within, is carried off by theſe real, though imperceptible funnels; which conſtitutes what we uſually term inſenſible perſpiration. The threads ſo multiplied, that neither the point of the ſmalleſt needle, nor the incomparable nicer ſpear of a gnat, nor even the inviſible lancet of a flea, can pierce any part, without cauſing an uneaſy ſenſation and ſuffuſion of blood; conſequently not without wounding, even by ſo ſmall a puncture, both a nerve and vein*.

The veins, either pervading or lying parallel with this fine tranſparent coat, beautify the human ſtruc-

* A *blood-veſſel* at leaſt. Compared with the veſſels, the fine *filmy threads*, which, on ſome bright, autumnal morning, float in the air, or hang on a ſtubble, are as *large* as a bell-rope, or *bulky* as a cable. Such tubes, one would think, would *burſt* at every breath we draw; or even *break* with their own fineneſs. Yet they are the conduit pipes, which convey the vital fluid from and to the grand reſervoir. And ſo exquiſitely admirable is their texture, that they will outlaſt the ſtrength of lead, or the heart of oak; *theſe* wearing away; *thoſe* growing ſtronger, by uſe.

ture;

ture; thoſe parts eſpecially, which are moſt conſpicuous, and intended for public view. The pliant wriſt, and the taper arm, they variegate with an inlay of living ſapphire. They ſpread vermillion over the lips, and plant roſes in the cheeks; while the eye, tinged with jet, or ſparkling with the blue of heaven, is fixed in an orb of poliſhed cryſtal. Inſomuch that the earthly tabernacle exhibits the niceſt proportions, and richeſt graces; ſuch nice proportions, as afford the moſt correct model for ſtatuary; ſuch rich graces, as the canvas never bore, as painting imitates in vain.

Perhaps, my dear boy may think, that a courſe of inceſſant action muſt *exhauſt* the fluids; waſte the ſolids; and (unleſs both are ſupplied with proper recruits) at length totally deſtroy the machine. For this reaſon it is furniſhed with the powers of nutrition: *teeth*, the foremoſt, thin and ſharp, fitted to cut off a convenient portion for the mouth; the hindermoſt, broad and ſtrong; indented like a millſtone, to grind whatever is tranſmitted to their operation. Were the teeth covered with a membrane, the act of *chewing* would occaſion uneaſineſs; and eating a hard ſubſtance might lacerate the tegument. Were the teeth without a covering, they would ſuffer from inclemencies of the air, and be liable to the penetration of liquors. Thus they would ſoon become unfit for ſervice,

and

and perhaps perifh. To guard againft thefe difadvantages, a neat *enamel*, white as ivory, and harder than the bone itfelf, *glazes* them; which renders them an ornament to the mouth; fecures them from injuries; and exempts them from pain in the office of maftication. As the rims and cufhions of a billiard-table keep the ball from flying off, and fend it into the green area, for repeated effays of fkill, fo the lips prevent the food from flipping out of the mouth; and affifted by the tongue, returns it to the attrition of the grinders. While the *lips*, in concert with the cheeks, are thus employed, their motion compreffes the circumjacent glands; and from innumerable little orifices, a thin *pellucid fluid* exudes, which moiftens the attenuated food, and prepares it for more eafy digeftion. When the mouth remains inactive, thefe fountains of fpittle are, in a manner, clofed; but when it is exercifed either in fpeaking or eating, they never fail to give a fufficient quantity of moifture; it being at fuch times peculiarly neceffary.

I am sincerely your's.

My dear Boy,

WHEN the ſoldier charges his carbine, the cartridge could not make it's way to the bottom, without the protruſion of the rammer. Neither would the food, which we receive at the mouth, deſcend by the force of it's own weight, through a narrow and clammy channel, into the ſtomach. To effectuate, therefore, and expedite it's paſſage, muſcles, both *ſtraight* and *circular*, are provided. The former enlarge the cavity of the throat, and afford a more eaſy admittance; the latter, cloſing behind the deſcending aliment, preſs it downward, and finiſh the deglutition. Before the food enters the gullet, it muſt of neceſſity paſs over the orifice of the *wind-pipe*; conſequently, muſt be in danger of falling upon the lungs; which would, if not entirely obſtruct the breath, yet occaſion violent coughing, and great inconvenience. To obviate this, the Great CONTRIVER has placed a *moveable lid*, which is ſhut cloſe, when the ſmalleſt particle of food advances to enter the ſtomach: but the inſtant the morſel is ſwallowed, the lid is ſet looſe, and remains open. By this two-fold artifice, the important paſſage is barred againſt any noxious approaches; yet is left free for the neceſſary acceſſion of air, and commodious for the purpoſes of reſpiration.

When the malſter prepares his grain for the tranſmutations of the brewhouſe; he lets it lie ſeveral hours ſteeping in the ciſtern, before it is fit to be ſpread upon the floor, or dried upon the kiln. The meat and drink likewiſe muſt remain a conſiderable time in the *ſtomach*, before they are of a proper conſiſtence and temperature, either for the tender coats, or the delicate operation of the bowels. For which purpoſe that *great receiver* is made, ſtrong to bear, capacious to hold, and ſo curiouſly contrived, as to lay a *temporary embargo* upon it's contents. Here they are lodged in the very centre of warmth, and concocted by a kindly combination of heat and humidity. Here they are ſaturated with fermenting or diluting juices; and kneaded, as it were, by the ſtomach's motion, and compreſſion of the neighbouring parts. So that the ſmalleſt fragment is ſeparated; the whole is reduced to a *tenuity*, finer than grinding could effect; and all is worked into the ſmootheſt pulp imaginable. From hence it is diſlodged by a gentle force; and paſſes, by a gradual tranſition, into the cavity of the inteſtines. Near the entrance, punctual as a porter in his lodge, waits the *gall-bladder*; ready to transfuſe on the advancing aliment it's acrimonious but ſalutary juices: which *diſſolve* it's remaining viſcidities; *ſcour* the paſſage of the inteſtines; and keep all it's apertures clear. This bag, as the ſtomach fills, is elevated by the diſtention; as the ſtomach empties,

is

is proportionably depreſſed. The former poſture cauſes a diſcharge; the latter occaſions a ſuppreſſion of the *bile*. It is furniſhed alſo with a valve of a peculiar, but convenient, form; through which the deterſive fluid cannot haſtily pour, but muſt gently ooze. Admirable conſtruction! which without our care or conſciouſneſs, prohibits an *immoderate* effuſion, yet aſcertains the *neceſſary* ſupply. Sufficiently charged with this fluid, the nutritive maſs purſues it's courſe through the *inteſtines*: whoſe meanders are more curious, than the artful mazes of a labyrinth. The inteſtines are actuated by an undulatory motion; which protrudes the received aliment; and forces it's milky particles into the *lacteal ducts*. Theſe are a ſeries of delicate *ſtrainers*; ranged in multitudes, along the ſides of the winding paſſage: ſo nicely framed, as to admit the balmy juices, but to reject the excrementitious dregs. Had the inteſtines been *ſtraight* and *ſhort*, the food might have gone through them, without reſigning a ſufficient quantity of it's nouriſhing particles. Therefore this grandeſt of all the ducts is artfully convolved, and extended to afford nature an opportunity of *ſifting* whatever paſſes, and of detaining whatever may ſerve her purpoſes. Leſt ſuch length of entrails ſhould be entangled among themſelves, or be cumbrous to the wearer, they are packed into neat folds, and lie within a narrow compaſs. Although at leaſt ſix

times longer than the body which contains them; yet they are *lodged* in a *part* of the lower belly; and, in this ſmall ſpace, have ſufficient room to execute their important functions. Though the alimentary ſubſtance can never miſtake it's way; yet through ſome accidental impediment, it may attempt to return backward. In this caſe, a valve intervenes; and renders what would be extremely pernicious, almoſt always impracticable. As the whole proceeds in this ſerpentine courſe, it is perpetually ſending off detachments of *nutricious* juices; in conſequence of which, it would loſe it's ſoft temperature; and perhaps be hindered from ſliding to it's final exit. To prevent ſuch an obſtruction, glands are poſted in proper places; which diſcharging a *lubricating* fluid, aid the progreſs of the maſs, and renew the ſecretion of the chyle; till all that remains of the one is cleanly drawn off; and the other—but excuſe me.

The *chyle*, abſorbed by the ſecretory orifices, is carried along millions of ducts, and lodged in *commodious cells*. As a traveller, by taking proper refreſhment on the road, is more enabled to purſue his journey; ſo the chyle, diverting to theſe little inns, is mixed with a diluting, watery ſubſtance, which renders it more eaſy to flow, and more fit for uſe. From hence it is conveyed to one *common receptacle*, and then mounts through a perpendicular tube.

When

When ammunition is tranſmitted to an army, it generally paſſes under an eſcort of able troops. As the chyle is the immediate ſupport of the whole ſyſtem, it's conveyance is guarded with peculiar attention. The *perpendicular tube*, not having ſufficient force of it's own, is laid contiguous to the great artery, whoſe ſtrong pulſation drives on the creeping fluid, enables it to overcome the ſteep aſcent, and to unload it's treaſure at the door of the heart. Here it enters the large vein, in a *ſlanting* direction, by which it avoids thwarting the purple ſtream; and the ſtream, inſtead of obſtructing it's admiſſion, expedites it's paſſage; inſtead of being a bar to exclude it, becomes it's waſting vehicle. The entrance is ſecured by a valve, admirably conſtructed and happily ſituated; which *ſhuts* the aperture againſt the refluent blood, but opens an eaſy avenue to introduce this manna of nature. The *blood*, through every ſtage of it's circuit, having ſuſtained great expences, being laid under contribution, by every gland in the ſyſtem; and having ſupplied myriads of capillary veſſels with matter, for inſenſible perſpiration; would be impoveriſhed, were it not recruited by this acceſſion of chyle. Yet though *recruited*, it is not *refined*. In it's preſent crude ſtate it is abſolutely unqualified to perform the vital tour, or carry on the animal functions. Therefore, by a grand apparatus of muſcular fibres, it is wafted into the *lungs*; and pours ten thouſand rills into either

lobe. In the ſpongy cells of this *laboratory*, it imbibes the influences of external air; it's heterogeneous parts are incorporated; and it's whole ſubſtance is made cool, and florid.—Thus improved, it is tranſmitted to the left ventricle of the HEART; a *ſtrong*, *indefatigable* muſcle; placed in the very centre of the ſyſtem. Impelled by which, part ſhoots upward; and ſweeps with a bounding impetus into the head. There it impregnates the prolific fields of the brain; and forms thoſe *ſubtile* ſpirituous dews, which impart ſenſe to every nerve, and communicate motion to every limb. Part flows downward; rolls the reeking current through all the lower quarters; and diſpenſes the nutrimental ſtores, even to the meaneſt member, and the minuteſt duct.

Farewell.

OBSERVE, my dear pupil, how the ſtately *Thames* refreſhes the groves, waters the towns on it's banks, and makes the meadows laugh and ſing. So with a *richer* fluid, and *more numerous* ſtreams, this human river, the blood, laves the ſeveral regions of the body; transfuſing vigour, and propagating health, through the whole. But a ſtream, divided into myriads of channels, and pervading innumerable tracts, how

how ſhall it be brought to it's ſource? Should any portion, like waters after a flood, deviate from it's courſe, or be unable to return, putrefaction would follow—perhaps death might enſue. Therefore, the all-wiſe CREATOR has connected the extremity of the arteries, with the beginning of the veins; ſo that the ſame force, which *darts* the crimſon wave through the former, *drives* it through the latter. Thus it is reconducted, without the leaſt extravaſation, to the great ſalient ciſtern*. There played off a-freſh, it renews and perpetuates the vital functions.

From the warm heart the ſanguine ſtream diſtils,
O'er beauty's radiant ſhrine in vermil rills,
Feeds each fine nerve, each ſlender hair pervades,
The ſkin's bright ſnow with living purple ſhades;
Each dimpling cheek with warmer bluſhes dyes,
Laughs on the lips, and lightens in the eyes.
Erewhile abſorb'd, the vagrant globules ſwim
From each fair feature, and proportion'd limb,
Join'd in one trunk with deeper tint return,
To the warm concave of the vital urn.

* *Solomon* makes uſe of this ſimilitude. *Or ever the pitcher be broken at the fountain, or the wheel be broken at the ciſtern.* The two *ventricles* of the heart, repleniſhed with blood, are fitly repreſented by a *ciſtern*: and the *contractile* force of their fibres, acts like the *water-wheel* in hydraulics. The *pitcher* which receives the water at the ſpring-head, and conveys it away for the owner's ſervice, may probably ſignify the *aorta*, and the *pulmonary* artery: whoſe functions correſpond with the uſes of ſuch a veſſel.

Where

Where two *oppoſite* currents would be in danger of meeting, a fibrous excreſcence interpoſes; which, like a projecting pier, breaks the ſtroke of each, and throws both into their proper receptacle. When the waſture is to be *ſpeedy*, the channels either forbear to wind in their courſe, or to leſſen in their dimenſions. When the progreſs is to be *retarded*, the tubes are twined into various convolutions, or their diameter is contracted. Modelled by theſe judicious rules, guarded by theſe wiſe precautions, the living flood never diſcontinues it's interchangeable tide; but, night and day, ſtill perſeveres to ſally *briſkly* through the arteries, and return *ſoftly* through the veins.

Such are the expedients to elaborate the chyle; to blend it with the blood, and to diſtribute both through the body; by means of which, the animal conſtitution is maintained. In youth, it's bulk is increaſed; in age, it's decays are repaired; and it is kept in tenantable condition for the ſoul, during the ſpace of about ſeventy years.

Theſe are but a few inſtances of that contrivance, regularity, and beauty, which are obſervable in the human frame. Attentive inquirers diſcover *deeper* footſteps of deſign, and *more refined* ſtrokes of ſkill, not only in the grand and moſt diſtinguiſhed parts, but

but in every limb, in every organ; I may add, in every fibre that is extended, and in every globule that flows.

You ſee, my love, what a *various*, but *uniform* ſyſtem, is the body! You ſee the greateſt multiplicity of parts, yet the moſt perfect harmony ſubſiſts between them all: no one hinders, but each aſſiſts the operations of another, and all conſpire to the benefit and preſervation of the whole. But this ſyſtem, though endued with a principle of *motion*, and furniſhed with the powers of *nutrition*, is ſtill without ſenſe. The creation abounds with objects fitted to yield the moſt refined entertainment. The ſun impurples the robe of morning, and ſtars beſpangle the curtains of night. Flowers of ſilver whiteneſs, and golden luſtre, enamel the ground. Fruits of all radiant hues, and of every delicious taſte, hang amiably dangling on the boughs.

> Airs alſo, vernal airs,
> Breathing the ſmell of field and grove, attune
> The trembling leaves.

But we hear of no capacities for enjoying theſe delights. Without which, the breath of ſpring would loſe it's fragrance, the whiſpering grove would degenerate into ſilence; and nature's book, all

all fair and inſtructive, would be no other than a vaſt unmeaning blank.

Therefore, the CREATOR, profuſely gracious to mankind, has made us an ineſtimable preſent of the *ſenſes*; to be the inlets of innumerable pleaſures, and the means of adminiſtering the moſt valuable advantages. High in the head, bright as a ſtar in the brow of evening, is placed the *eye*. In this elevated ſituation, like a centinel poſted in his watch-tower, it commands the moſt enlarged proſpect. Conſiſting only of ſimple fluids, incloſed in thin tunicles, it conveys to our apprehenſion all the graces of blooming nature, and all the glories of the viſible heavens. How wonderful! that an image of the *hugeſt* mountain, and a tranſcript of *diverſified* land-ſcapes, ſhould enter the ſmall circlet of the pupil! How ſurpriſing! that the rays of light, ſhould paint in their *trueſt* colours, and *moſt exact* lineaments, every ſpecies of external objects.

The eye is ſo tender, that a ſlight accident would greatly injury it's delicate frame. It is guarded, therefore, with a circumſpection proportioned to it's texture and uſe. It is *intrenched* deep in the head; and *barricaded* on every ſide with a bony fortification. As the incurſion of the ſmalleſt fly would incommode the poliſhed ſurface, it is defended by two ſubſtantial *curtains*, hung on a ſlender cartilaginous

tilaginous rod; which ſecure it, not barely from blows, and any hurtful attrition, but alſo from every troubleſome annoyance. In ſleep, when there is no occaſion to exerciſe the ſenſe, but a neceſſity to protect the organ, theſe curtains *ſpontaneouſly* cloſe, and never fail to lie ſhut. At any time they will fly together with a motion, quick as the alarm of fear, I had almoſt ſaid quicker than thought itſelf. At all times they are lined with an extremely fine ſponge, moiſt with it's own *dew*; which lubricates the eye-ball, oils as it were it's wheels, and fits it for a courſe of unwearied activity. At the end of this ſkinny mantelet (if I may uſe the military ſtyle) is planted a range of briſtly *paliſadoes*, which keep out the leaſt mote, ward off even the ſtraggling atom, and moderate the potent impreſſions of the ſun-beams.

The *brows* are a kind of natural *pent-houſe*, thatched and arched with various wreaths of hair. The thatch is intended to divert the ſweat from trickling into the eyes, and offending them with it's brine. The *arches* are ſo finely coloured, and ſo elegantly turned, that they ſet off the forehead's poliſh, and beſtow additional grace on the whole countenance. Becauſe, in our waking hours, there is almoſt an inceſſant call for theſe little orbs; they run upon the fineſt *caſters*, rolling upward or downward to the right hand or to the left, with the ut-

moſt

moſt ſpeed, and with equal eaſe. Which circumſtance, added to the flexibility of the neck, render our *two* eyes as uſeful, as if the whole body, like the living creatures in *St. John's* viſion, was *full of eyes before and behind.*

The *ear* conſiſts of an outward porch and inner rooms, with tools of admirable contrivance and finiſhed workmanſhip. The *porch*, I name that ſemicircular lodge, which ſtands ſomewhat prominent from the head; and is not *ſoft* as fleſh, leſt it ſhould abſorb the ſound rather than promote the repercuſſion; not *hard* as bone, leſt it ſhould occaſion inconveniencies when we repoſe; but of a *cartilaginous* ſubſtance, covered with a tight expanſion of ſkin, and wrought into irregular bends and hollows: which, like circling hills, or rocky ſhores, collect the the wandering undulations of the air, and tranſmit them to the finely-ſtretched membrane of the tympanum. The *avenue* is ſecured from the inſinuating attempts of little inſects, by a *moraſs* (ſhall I ſay?) of bitter and viſcous matter; diſguſtful to their taſte, and embarraſſing to their feet. The *hammer*, and the *anvil*; the *ſtirrup*, and the *drum*; the winding labyrinths, and the ſounding galleries; theſe, and other pieces of mechaniſm, all inſtrumental to the power of hearing are curious, beyond my powers of deſcription.

Amazingly

Amazingly nice muſt be the formation, and inconceivably exact the tenſion, of the auditory nerves; ſince they correſpond with the ſmalleſt tremors of the atmoſphere, and eaſily diſtinguiſh their ſubtile variations. With the gentle gales that fan us, or even with the ruder blaſts that aſſault us, theſe ſtrings are but little affected. Whereas they are perfect *uniſons* with thoſe fine, thoſe *ſignificant* agitations of the air, which the acuteſt touch is unable to diſcern. Theſe living chords, tuned by an ALMIGHTY HAND, and diffuſed through the echoing iſles and ſonorous cells—theſe receive the impreſſions of ſounds, and propagate them to the brain. Theſe give exiſtence to the charms of muſic, and reciprocate the rational entertainments of diſcourſe. Theſe treat my George with the melody of the grove; and afford *me* the ſuperior pleaſure of his converſation.

The eye perceives only the objects before it; the ear warns us of tranſactions, above, below, and all around us. The eye is uſeleſs amidſt the gloom of night, and cannot carry it's obſervation through the bolted door, or the cloſed ſhutter. But the ear admits her intelligence through the *darkeſt* medium and *minuteſt* cranny. The eye is upon duty, only in our waking hours; but the ear is always expanded, and always acceſſible; a courier who never tires,

a ſentry

a ſentry ever in his box. To ſecure a reſource, ſhould a misfortune diſable *one* of the hearing or ſeeing organs, our gracious Maker has given us *duplicates* of each.

Adieu.

Dear Boy,

As there are tremulous concuſſions impreſſed upon the air, diſcernible only by the inſtruments of hearing; there are alſo *odoriferous* particles, wafted by the ſame aereal vehicle, which are perceivable only by the *ſmell*.—The noſtrils are wide at the bottom, that a large quantity of effluvia may enter; narrow at the top, that when entered, they may cloſe their ranks, and act with greater vigour. Fine beyond imagination, are the ſtreams which exhale from fetid or fragrant bodies. The beſt microſcopes, which diſcover *thouſands* of animalcules in a drop of putrified water, cannot bring one individual, among all theſe legions, to our ſight. They ſail, in numberleſs ſquadrons, cloſe to our eyes, cloſe by our ears; yet are ſo amazingly attenuated, that they elude the ſearch of both. Nevertheleſs, ſo judiciouſly are the *olfactory* nets laid, and ſo artfully their meſhes ſized, that

that they catch theſe vaniſhing fugitives; they catch the roving perfumes which fly from the opening honey ſuckle, and take in the ſweets which hover round the expanded roſe. They imbibe the balmy fragrance of ſpring, the aromatic exhalations of autumn, and enable us to banquet even on the *inviſible* dainties of nature.

Furniſhed with theſe ſeveral organs,

> Not a breeze
> Flies o'er the meadow, not a cloud imbibes
> The ſetting ſun's effulgence, not a ſtrain
> From all the tenants of the warbling ſhade
> Aſcends, but whence our ſenſes can partake
> Freſh pleaſure.

Another capacity for frequent pleaſure, our bountiful CREATOR has beſtowed in granting us the powers of *taſte*. By means of which, the food that ſupports our body, feaſts our palate; it firſt treats us with a pleaſing regale; then, diſtributes it's beneficial recruits. The razor, whetted with oil, becomes more exquiſitely keen. The *ſaliva*, flowing upon the tongue, and moiſtening it's nerves, quickens them into the livelieſt ſenſation. The ſight, the ſmell, the taſte are not only ſeparate ſources of delight, but a joint ſecurity to our health. They are the accurate inſpectors, which examine our food, and inquire whether it be pleaſant or diſagreeable; wholeſome or noxious. For the diſcharge of this office,

office, they are well qualified, and commodiouſly ſituated. So that nothing can gain admiſſion through the mouth, till it has undergone the ſcrutiny, and obtained the paſſport of them all.

To theſe, as a neceſſary ſupplement, is added the ſenſe of *feeling*; which renders the whole aſſemblage complete. While other ſenſes have a particular place of reſidence, this is diffuſed throughout *the whole* body. In the palms of the hands, on the tips of the fingers, and through all the extreme parts of the fleſh, it is quick and lively. The army of *Xerxes*, with all his attendants *, were but like a few *gleaners* ſtraggling in a field, if compared with thoſe nervous detachments, which pervade the texture of the ſkin, and miniſter to the act of feeling. How happily is this ſenſe tempered between the two extremes! Neither ſo *acute* as the membranes of the eye, nor ſo *obtuſe* as the callous of the heel. The former would expoſe us to continual pain; render our clothes galling, and even the very *down* oppreſſive. The latter would benumb the body, and almoſt annihilate the touch. Nor this alone, but *all* the ſenſes are exactly adapted to their reſpective offices, and to the exigencies of our ſtate. *Strained* to a higher tone, they would be avenues of anguiſh; *re-*

* The ſoldiers and attendants of *Xerxes*, amounted to five millions two hundred and eighty thouſand!

laxed

laxed into greater inſenſibility, they would be uſeleſs incumbrances. How admirable is this proviſion, to accommodate us with delightful ſenſations and inſtructive ideas! The taſte, the touch, and the ſmell, are ſomewhat *ſtraitened* in the extent of their operations. The ear carries on a correſpondence with a *larger* circle of objects. But the ſight moſt amply ſupplies whatever is wanting in all the other ſenſes. The ſight ſpreads itſelf to an *infinite* multitude of bodies, and brings within our notice ſome of the *remoteſt* parts of the univerſe. The taſte, the touch, the ſmell, perceive nothing but what is brought to their doors. Whereas the eye extends it's obſervation, as far as the orbit of *Georgium Sidus*, nay, glances in an inſtant to the inconceivable diſtance of the ſtars.

Farewell.

Dear George,

THE crowning gift, accruing from all the ſenſes, is *ſpeech*. Speech makes you a gainer from the eyes and ears of other perſons; from the ideas they conceive, and the obſervations they make. And what an admirable inſtrument, for articulating

the voice, and modifying it into ſpeech, is the *tongue!* which having neither bone nor joint, faſhions itſelf, with the utmoſt volubility, into every ſhape and every poſture, that can expreſs ſentiment, or conſtitute harmony. This little collection of muſcular fibres, is the artificer of our words. By this we communicate the *ſecrets* of the breaſt, and make our *thoughts* audible. By this we inſtruct the ignorant, and comfort the diſtreſſed; we glorify God, and edify each other: the academic, by this, explains the ſciences; and the eccleſiaſtic preaches the goſpel truth. This is likewiſe the efficient of *muſic*. It is ſoft as the lute, or ſhrill as the trumpet; it can warble as the lyre, or reſound like the organ. Connecting the ſacred anthem with it's tuneful ſtrains, we ſooth the cares, and beguile the toils of life; we imitate the angelic choirs, and anticipate, in ſome degree, their celeſtial joys. As the tongue requires full ſcope, and an eaſy play, it is lodged in an ample cavity; and ſurrounded with reſervoirs of ſpittle, always ready to diſtil the lubricating dews. It moves under a concave roof, which ſerves for a *ſounding-board* to the voice; giving it much of the ſame vigour and grace, as the ſhell of a violin adds to the language of the ſtrings.

And how gracious is the regulation of *ſpontaneous* and *involuntary* motion! Was this regulation reverſed, what inconveniencies would take place; what

what ruin would enſue! *Inconveniences*; if the diſcharges of the bowels, or evacuations of the bladder, were independent on our leave. *Ruin*; if the action of the heart required the co-operation of our thoughts, or the buſineſs of reſpiration waited for the concurrence of our will.

The will, in ſome caſes, has not ſo much as a ſingle vote: in others, ſhe *determines* and *commands*, as an abſolute empreſs: nor is there a monarch upon earth ſo punctually obeyed, as the queen of the human ſyſtem. If ſhe but intimate her pleaſure, the ſpirits run, they fly, to execute her orders; to ſtretch the arm, or cloſe the hand; to furrow the brow, or dimple the cheek. How *eaſily*, as well as *punctually*, are theſe orders carried into execution! To turn the ſcrew, or work the lever, is laborious and weariſome: but we move the *vertebræ*, with all their appendant chambers; we advance the leg, with the whole incumbent body; we ariſe from our ſeat; we ſpring from the ground: and though much force is exerted, though a very conſiderable weight is raiſed, we meet with no difficulty, we complain of no fatigue.

That all this ſhould be effected without toil, and by a *bare act* of the will, is ſurpriſing. But that theſe motions ſhould be made, renewed, continued, even while we remain *entirely* ignorant of the *man-*

ner in which they are performed, is beyond meaſure aſtoniſhing. Who can play a tune upon the harpſichord, without learning the difference of the keys? Yet the mind of man touches *every* ſpring of the human machine, with the moſt maſterly ſkill; though ſhe knows nothing of her implements, or the proceſs of her operations. We walk, we run, we leap; we throw ourſelves into a variety of poſtures, and perform a multitude of motions; yet are unable to ſay which nerve ſhould be active; which muſcle ſhould ſwell; or which tendon approximate.

Put a *German* flute into a perſon's hand, without a maſter to inſtruct him, and he will be unable to ſound the inſtrument; much leſs will he be able to ſoften and extend the ſound, juſt as he pleaſes. Yet we are ſelf-taught in the method of *forming*, *regulating*, and *varying* the voice. With unpremeditated fluency, we give it the languiſhing cadence of ſorrow, or the ſprightly airs of joy; the faultering accents of fear, or the elevated tone of anger.

The eye of one who is ignorant of the laws of optics, ſhall *lengthen* and *ſhorten* it's axis, *dilate* and *contract* it's pupil, without the leaſt heſitation, and with the utmoſt propriety; adapting itſelf, even with mathematic exactneſs, to the particular diſtance of objects, and to the different degrees of light.

ſight. By which means, it performs ſome of the moſt curious experiments in the improved *Newtonian* philoſophy, without the leaſt knowledge of the ſcience, or a conſciouſneſs of it's own dexterity.

I can never ſufficiently admire this multiplicity of animated organs; their finiſhed form, their faultleſs order. Yet I confeſs myſelf ſtruck with greater admiration at the *myſterious* power which the ſoul exerciſes over them. Ten thouſand reins are put into her hand; ſhe is unacquainted with their uſe, or their name; ſhe has not learned to diſtinguiſh one from another: nevertheleſs, ſhe manages all, and conducts all, without the leaſt perplexity or irregularity. Great reaſon had an ancient poet * to name the HUMAN BODY—*the infinitely varied, and inimitably fine workmanſhip of a great, ſupreme, unerring* ARTIST.

My dear George, Adieu.

* Euripides.

ABBREVIATIONS.

ABBREVIATIONS AND TERMS RELATIVE TO

Books.

Fol. *Folio.* A book is ſaid to be in folio, when a ſheet of paper makes only two leaves, or four pages.

4to. *Quarto*, when one ſheet makes four leaves, or eight pages.

8vo. *Octavo*, eight leaves.

12mo. *Duodecimo*, twelve leaves, uſually called twelves.

The *Frontiſpiece*, the picture facing the title-page.

The *Title-page*, the firſt page of every book, containing the title.

The *Running-title*, the word or ſentence at the top of every page.

A *Column.* When the page is divided into ſeveral parts by a blank ſpace, or a line running from the top to the bottom, each diviſion is termed a column: as in bibles, dictionaries, news-papers, &c.

A, *B*, *C*,—*a*, *b*, *c*, &c. are named ſignatures, and are directions for book-binders to fold and collate the ſheets. Many other characters are uſed for the ſame purpoſe; ſuch as *, †, &c.

Abbreviations of Latin Words,

FREQUENTLY FOUND IN

Printed Books & Manuſcripts.

A. R. *Anno Regni*, in the year of the reign.

Lib. *Liber*, book.

MS. *Manuſcriptum*, manuſcript.

MSS. *Manuſcripta*, manuſcripts.

P. S. *Poſt-ſcriptum*, a poſtcript, or ſomething written afterwards.

N. B. *Nota bene*, obſerve.

v. g. *Verbi gratia*, for inſtance, if the example is but one word.

e. g. *Exempli gratia*, for example.

viz. *Videlicet*, namely; viz is a corrupt abbreviation.

i. e. *Id eſt*, that is.

v. *Vide*, ſee.

Id. *Idem*, the ſame (author).

Ibid. *Ibidem*, in the ſame place (or book).

No. *Numero*, in number.

q. d. *Quaſi dicas*, as if you ſhould ſay.

&c. *Et cætera*, and others. When this character is placed after a liſt of men, it ſhould be called *et cæteri*; after a liſt of women, *et cæteræ*; and after a variety of things in the neuter gender, *et cætera*, as it is uſually pronounced.

Abbreviations in Titles.

J. H. S. *Jesus hominum salvator*, Jesus Saviour of men.

G. R. *Georgius rex*, George the king.

A. R. *Anna regina*, queen Ann.

K. G. Knight of the garter.

L. C. J. Lord chief justice.

K. B. Knight of the bath.

K. T. Knight of the thistle.

S. T. P. *Sacræ theologiæ professor*, professor of divinity: latin terms for D. D.

D. D. Doctor of divinity.

M. D. *Medicinæ doctor*, doctor of physic.

L. L. D. *Legum doctor*, doctor of laws, that is, the canon and civil laws.

J. U. D. *Juris utriusque doctor*, doctor of laws.

B. D. Bachelor of divinity.

A. M. *Artium magiſter*, maſter of arts.

C. P. S. *Cuſtos privati ſigilli*, keeper of the privy ſeal.

A. B. *Artium baccalaureus*, bachelor of arts.

F. R. S. Fellow of the royal ſociety.

R. S. S. *Regiæ ſocietatis ſocius*, fellow of the royal ſociety.

S. A. S. *Societatis antiquariæ ſocius*, fellow of the antiquarian ſociety.

Single letters in inſcriptions upon coins and medals, are generally abbreviations.—The inſcription upon our own coin runs thus, GEORGIUS III. DEI GRATIA, M. B. F. ET H. REX. F. D. B. ET L. D. S. R. I. A. T. ET E. That is, *Georgius tertius, Dei Gratia, Magnæ Britanniæ, Francæ, et Hiberniæ, Rex, Fidei Defenſor, Brunſwicci et Lunenburgi Dux, Sacri Romani Imperii Archi-Theſaurarius et Elector*. George the third, by the Grace of God, King of Great Britain, France, and

and Ireland, Defender of the Faith, Duke of Brunſwick, and Lunenburgh, Arch-Treaſurer and Elector of the Holy Roman Empire.

Abbreviations in

Chronology and Geography.

A. M. *Anno mundi*, in the year of the world.

Ant. Chr. *Ante Chriſtum*, before the birth of Chriſt.

A. U. C. *Anno urbis conditæ*, in the year after the building of Rome. This epocha commences 753 years before the birth of Chriſt; and is generally uſed in the Roman hiſtory.

A. D. *Anno Domini*, in the year of our Lord. The Chriſtian æra, according to archbiſhop Uſher, A. M. 4004.

O. S. Old Style: the method of computation uſed in England before the year 1752; when ſome errors in the calendar were corrected by act of parliament.

N. S.

N. S. New Style.

A. M. *Ante meridiem*, in the forenoon.

P. M. *Poſt meridiem*, in the afternoon.

E. W. N. S. Eaſt, weſt, north, ſouth.

N. L. 52°. 45′. 3″. North latitude, 52 degrees, 45 minutes, 3 ſeconds.

Every circle is ſuppoſed to be divided into 360 parts, termed degrees; each degree into 60 other parts, named minutes; each minute into 60 ſeconds, each ſecond into thirds, &c. The ° at the top of the figure probably repreſents the circle, which is thus divided.

Abbreviations in *Arithmetic and Commerce.*

L. *Libra*, a pound in money.

S. *Solidus*, a ſhilling.

D. *Denarius*, a penny.

Ob.

Ob. *Obolus*, a halfpenny.

Q. *Quadrans*, a farthing.

Cwt. An hundred weight, 112lb.

Per Cent. *Per centum*, by the hundred.

Per an. *Per annum*, by the year.

Do. *Ditto*, (from *detto*, Ital.) the ſaid.

lb. *Libra*, a pound, twelve ounces of troy weight, uſed by goldſmiths, apothecaries, &c. and ſixteen ounces of avoirdupois.

Latin Words explained.

Errata, errors.

Corrigenda, to be corrected.

Addenda, to be added.

Mutanda, to be altered.

Delenda, to be blotted out.

Pro, for.

Lege, read.

Dele, erase.

Finis, the end.

Imprimis, in the first place.

Item, also.

Ipso facto, in very fact.

De facto, matter of fact.

De jure, of right.

Probatum est, it is approved.

Vi et armis, by force and arms.

Jure divino, by divine right.

Alias, otherwise.

Ipse dixit, himself says so.

NUMERAL LETTERS.

NUMBERS

ARE WRITTEN

BY LETTERS AND FIGURES.

	Roman numerals.	Figures.
One	I	1
Two	II	2
Three	III	3
Four	IV	4
Five	V	5
Six	VI	6
Seven	VII	7
Eight	VIII	8
Nine	IX	9
Ten	X	10
Twenty	XX	20
Thirty	XXX	30
Forty	XL	40
Fifty	L	50
Sixty	LX	60
Seventy	LXX	70
Eighty	LXXX	80
Ninety	XC	90
A hundred	C	100

Two

	Roman Numerals.	Figures.
Two hundred	CC	200
Three hundred	CCC	300
Four hundred	CCCC or CD	400
Five hundred	D or IↃ	500
Six hundred	DC	600
Seven hundred	DCC	700
Eight hundred	DCCC	800
Nine hundred	DCCCC or CM	900
A thousand	M or CIↃ	1000
Five thousand	IↃↃ	5000
Ten thousand	CCIↃↃ	10,000
Fifty thousand	IↃↃↃ	50,000
A hundred thousand	CCCIↃↃↃ	100,000
Five hundred thousand	IↃↃↃↃ	500,000
A million	CCCCIↃↃↃↃ	1,000,000

The Romans expressed any number of thousands, by a line drawn over a numeral, less than a thousand: $\overline{V}$ denotes five thousand, $\overline{LX}$ sixty thousand.

So likewise $\overline{M}$ stands for one thousand times a thousand, or a million; $\overline{MM}$ two millions, &c.

Numeral Letters Explained.

MDCLXVI 1666.

M. Denotes mille, 1000.

D. Dimidium mille, half a thousand, or 500; or it is probably the half of CIↃ.

C. Centum, 100.

L. Represents the lower half of the Saxon C; and consequently expresses 50.

X. Resembles two Vs, one upright, the other inverted; and signifies 10.

V. Stands for 5, because it's sister letter U is the fifth vowel.

I. Signifies 1, probably because it is the plainest and simplest character in the alphabet.

If two or three of these characters are placed together, and the less number is placed before the greater, the value of the less is to be deducted from the greater: as IX, 9; XIX, 19; CD, 400; CM, 900, &c.

ENGLAND

DIVIDED

INTO CIRCUITS.

Northern.	Yor. Dur–Nor. Cum–Lancas. *and* West.
Midland.	North. Rut–Linc–Der. No–War. Leicest.
Western.	Cor. De–Dor. *with* Somer–Wilt. Ham.
Norfolk.	Nor. Suf–Hun. Bucks. Bedford *and* Cam.
Oxford.	Shrop–Glouces. Ox–Staffordshire, Ber. *With* Monmouthshire, Wor'ster *and* Her.
Home.	Sur–Suffex, Kent, Hertford *and* Ess.
EXCLUDED.	Middlesex *with the old tea-pot* *Ches.

WALES contains of circuits four,
Which you may learn in half an hour.

The N. E. Mont–Flint *and* Denbigh,
The N. W. Car–Meri. Ang–I:
The S. E. Glamor–Rad. Brecknock,
The S. W. Cæmarth–Card. Pembroke.

* The form of Cheshire is not unlike that of a tea-pot.

THE CITIES

IN

England and Wales.

Norwich, Carliſle, Coventry,
Exeter *and* Sal'ſbury;
Peterborough, Canterbury,
Litchfield, Glouceſter, *and* Ely;
Bangor, Briſtol, Cheſter, Bath,
London, Lincoln, Wells, Landaff,
Durham, York, *and* St. Aſaph;
Chicheſter, Wincheſter, Weſtminſter, Rocheſter,
Hereford, Oxford, *and* 28*th*, Worceſter.

Artificial Memory.

Men of the most profound judgment, or lively imagination, have often the most unretentive memories.

Dr. Mavor.

THE following series of vowels and consonants (representing the figures) must be learned, so as to be able to form at pleasure a *technical* word, which shall stand for any number.

a	*e*	*i*	*o*	*u*	*au*	*oi*	*ei*	*ou*	*y*
1	2	3	4	5	6	7	8	9	0
b	*d*	*t*	*f*	*l*	*s*	*p*	*k*	*n*	*z*

Here *a* or *b* stands for 1; *e* or *d* for 2; *i* or *t* for 3; and so on. These letters assigned to the respective figures may easily be remembered: thus, the first vowels naturally represent 12345.

The diphthong *au* stands for 6, being composed of *a* 1, and *u* 5.

The diphthong *oi* stands for 7; and *ou* for 9.

The diphthong *ei* will easily be remembered for *eight*.

Initials

Initials are uſed where they could for the conſonants; as *t* for three, *f* 4, *s* ſix, and *n* nine.

The reſt were aſſigned without any particular reaſon, unleſs that poſſibly *p* may be more eaſily remembered for 7, or ſe*p*tem; *k* 8 or ὀκτὼ; *d* 2, or *d*uo; *b* for 1, the firſt conſonant; and *l* for 5, being the Roman letter for 50.

The diphthongs are to be conſidered as one letter, or rather as one figure; and *y* is to be pronounced as *w* to diſtinguiſh it from *i*: thus, *ſyd* 602, pronounce *ſwid*; *typ* 307, pronounce *twip*.

Exerciſe.

10	325	381	1921	1491	1012
az	*tel*	*teib*	*aneb*	*afna*	*bybe*
739	680	553	431	7967	602
pin	*ſeiz*	*lut*	*fib*	*pouſai*	ſyd

The ſame number may be ſignified by different words, according as vowels or conſonants are choſen to repreſent the figures, or to begin the words; thus,

325 *tel*, or *idu*,

154 *buf*, or *blo*, or *alf*, or *alo*.

93451 *ni-ola*, or *out-fub*, or *ni-fla*, or *out-olb*,

Although *z* or *y* represents the cypher, yet where many cyphers meet, to avoid a repetition of *azyzyzy*, I use *g* for an hundred; *th* for a thousand; and *m* for a million: thus,

ag	100	dlg	2300
ig	300	lath	51000
oug	900	am	1000000
ath	1000	azmoth	10004000
oth	4000	sumus	65000056
otho	4004	loum	59000000
peg	7200		

It may sometimes be required to set down a fraction, which can be done in the following manner: Let *r* be the separator between the numerator and the denominator, the first coming *before*, the other after it: as, *iro* $\frac{3}{4}$; *urp* $\frac{5}{7}$ *pourag* $\frac{79}{100}$ or .79; *north* $\frac{94}{1000}$ or .094, &c.

Where the numerator is 1, it need not be expressed, but begin the fraction with *r*: as $\frac{1}{2}$ *re*; $\frac{1}{3}$ *ri*, $\frac{1}{4}$ *ro*, &c. So in decimals, .01 or $\frac{1}{100}$ *rag*; .001 or $\frac{1}{1000}$ *rath*.

THE

Kings and Queens

OF

ENGLAND,

SINCE THE CONQUEST:

AND SOME OF

The most remarkable Princes,

BEFORE IT.

CASSIBELAUNUS chosen chief commander by the Britons against the invasion of Julius Cæsar. Ant. Chr. 52 years.

QUEEN BOADICEA, the British Heroine, being ill-treated by the Romans, raised an army and killed 70000. A. D. 67.

VORTIGERN, invited the Saxons to the assistance of the Britons against the Scots and Picts. A. D. 446.

HENGIST, the Saxon, erected the kingdom of Kent, the first of the Heptarchy. A. D. 455.

ARTHUR, was famous for his resistance and victories over the Saxons. A. D. 514.

EGBERT, reduced the Heptarchy and was crowned first sole monarch of England. A. D. 827.

ALFRED THE GREAT, ascended the throne in A. D. - - - - - -	871
CANUTE the Dane, began to reign	1017
EDWARD the Confessor - - -	1041
WILLIAM I. the Conqueror - -	1066
WILLIAM II. surnamed Rufus -	1087
HENRY I. - - - - - -	1100
STEPHEN - - - - - -	1135
HENRY II. - - - - - -	1154
RICHARD I. - - - - - -	1189
* JOHN - - - - - -	1199
HENRY III. - - - - - -	1216
EDWARD I. - - - - - -	1272
EDWARD II. - - - - - -	1307
EDWARD III. - - - - - -	1327
RICHARD II. - - - - - -	1377
HENRY IV. - - - - - -	1399
HENRY V. - - - - - -	1413
HENRY VI. - - - - - -	1422
EDWARD IV. - - - - -	1461
EDWARD V. - - - - - -	1483

* John signed the famous deed of Magna Charta, at Runimede, a place between Staines and Windsor.

RICHARD III. - - - -	1483
HENRY VII. - - - - -	1485
HENRY VIII. - - - -	1509
EDWARD VI. - - - -	1547
MARY - - - - - -	1553
ELIZABETH - - - -	1558
JAMES I. - - - - -	1603
CHARLES I. - - - - -	1625
CHARLES II. - - - - -	1649
JAMES II. - - - - -	1685
WILLIAM and MARY - - -	1689
ANNE - - - - - -	1702
GEORGE I. - - - - -	1714
GEORGE II. - - - - -	1727
GEORGE III. - - - - -	1760

Memorial Lines.

Caſs'bel-*ud*, Boad-*aup*, Vorg-*ſos*, Hengiſt-*ful*, Ar-*laſ*, Egber-*kep*, Alfred-*koib*, * Can D-*ap*, Ed Con-*ſa*, Wil C-*ſau*; Wil Ruſ-*koi*, Hen Pri-*ag*, Ste-*bil*, Hen Sec-*buſ*, Ri F-*bein*, Runi J-*ann*, Hen Thir-*das*, Ed F-*epe*, Ed Sec-*typ*, Ed Th-*iep*; Ri Sec-*toip*, Hen Fo-*toun*, Hen-Qu-*oat*, Hen Si-*ſed*, Ed F-*oſb*, Ed Qui R-*okt*, Hen Sep-*ſeil*, H Oc-*lyn*, Ed Six-*lop*, Ma-*lut*, Eliz-*luk*, Jam Pri-*ſyt*, Char P-*ſel*, Char Sec-*ſon*, Ja S-*ſeil*, Wil Ma-*ſein*, Anne-*pyd*, † Ge-*bo*-*doi*-*ſy*.

* Now add 1000. † add 1700.

Verses Valedictory.

DEAR YOUTH, be wiſe, nor ſwell the ſcroll of ſhame,
But ſhun betimes bewitching pleaſure's lure;
With zeal preſerve a fair, unſpotted fame,
And O! preſerve your conſcience ever pure.

With noble ſoul diſdain the partial view,
Revere the ſocial ties that join mankind;
To love, to honour, and to friendſhip true,
And let their dictates ever rule your mind.

Let pity's balm aſſuage affliction's ſmart,
With lenient hand the pangs of mis'ry heal;
Let mild benevolence entwine your heart,
And learn the ſacred luxury—to feel.

For know, unfriended, many a virtue weeps
In deep, ſequeſter'd ſolitude forlorn;
And many an eye unceaſing vigils keeps,
Whoſe cheriſh'd brightneſs might eclipſe the morn.

Thefe all have claim upon the favour'd few,
Whom fortune vifits with her golden ray;
Thefe all in grief's expreffive language fue—
O! hear their plaints, and wipe their tears away.

So fhall your hearts the facred pleafure tafte,
That flows from fympathy's benignant reign;
So tranfports foft fhall fmile around your breaft,
And foil the rankling barb of care and pain.

So fhall your days through varied life be blefs'd,
And fmiling peace your guiltlefs fteps attend;
So fhall your foul repofe in good poffefs'd,
And reap eternal joys, when time is at an end.

The following, by the Author, for the Use of his School.

Prayers.
Poetical Selections.
An Engliſh Spelling Book, on a new plan.
The Elements of Engliſh Grammar.
Engliſh Exerciſes, with Letters, &c.
Tables of Arithmetic, with notes.
A Plain Syſtem of Practical Arithmetic.